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APJ ABDUL KALAM TECHNOLOGICAL UNIVERSITY

B.Tech Degree S5 (R, S) / S5 (PT) (R, S) Examination December 2023 (2019 Scheme)

Course Code: MCN 301

Course Name: DISASTER MANAGEMENT

Max. Marks: 100 Duration: 3 Hours

PART A

(Answer all questions; each question carries 3 marks) Marks

1		Define the term "biosphere" and describe the three main components that constitute it.	3
2		What are disasters? What are their causes?	3
3		Define the term "hazard" and provide examples of natural and human-made hazards.	3
4		Define vulnerability in the context of disasters.	3
5		Define the term 'disaster preparedness.	3
6		Define 'relief' in the context of disaster management.	3
7		What distinguishes crisis counselling from regular counselling?	3
8		Explain the importance of communication in disaster management.	3
9		What role do local governments play in implementing disaster management legislation in India?	3
10		What are Tsunamis? How are they caused?	3

PART B

(Answer one full question from each module, each question carries 14 marks)

Module -1

11	a)	Briefly explain Indian Monsoon and factors affecting Indian Monsoon?	10
	b)	Explain greenhouse effect and global warming?	4
12		Explain the following terms in the context of disaster management (a) Disaster Risk Management (b) Crisis Counselling (c) Exposure (d) Early Warning Systems (e) Damage Assessment (f) Resilience (g) Needs Assessment	14

Module -2

13	a)	Explain the types of vulnerabilities and approaches to assess them.	10
	b)	Explain the application of hazard maps.	4

14		Describe in detail the approaches and procedures involved in disaster risk assessment.	14

Module -3

15	a)	Explain the factors that decide the nature of disaster response.	8
	b)	Explain disaster relief and international relief organizations.	6
16	a)	Explain the core elements of disaster risk management.	7
	b)	Explain the different disaster response actions.	7

Module -4

17	a)	What are the advantages and drawbacks of involving stakeholders in disaster management?	8
	b)	Explain capacity building in the context of disaster management.	6
18	a)	What is the process for identifying stakeholders in disaster management?	5
	b)	How can one ensure effective disaster communication by outlining the necessary steps, and what obstacles or barriers to communication should be considered in this context?	9

Module -5

19	a)	Discuss the priorities for action identified in the Sendai Framework. How can these priorities be tailored to address the specific needs and challenges faced by India?	9
	b)	What role do local governments play in implementing disaster management legislation in India.	5
20	a)	Discuss the key features and objectives of the National Disaster Management Policy in India. How does it guide the country in managing and reducing disaster risks?	7
	b)	What are the most common types of disasters faced by India.	7

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SOLUTIONS

1. R. Subramanian, Ch.1 Introduction to Environment & Biosphere-page. 1–5

The biosphere refers to the global ecosystem, encompassing all living organisms and their interactions with the environment. Its three main components are: **lithosphere** (land), which includes soil and rocks; **hydrosphere** (water), covering oceans, rivers, and lakes; and **atmosphere** (air), providing gases necessary for life, including oxygen and carbon dioxide.

2. M.M. Sulphey, Ch.1 Disaster Concepts and Definitions"; R. Subramanian, Ch.2-Page 3-7

Disasters are sudden, catastrophic events that cause significant disruption, destruction, and harm to communities, ecosystems, or economies. They can be natural, such as earthquakes and floods, or man-made, like industrial accidents and terrorist attacks. Causes include environmental factors, human activities, and systemic vulnerabilities, often exacerbated by climate change and poor planning.

3. R. Subramanian, Ch.3 "Natural and Man-Made Hazards"; UNDP Manual, Module 1-page 15–25

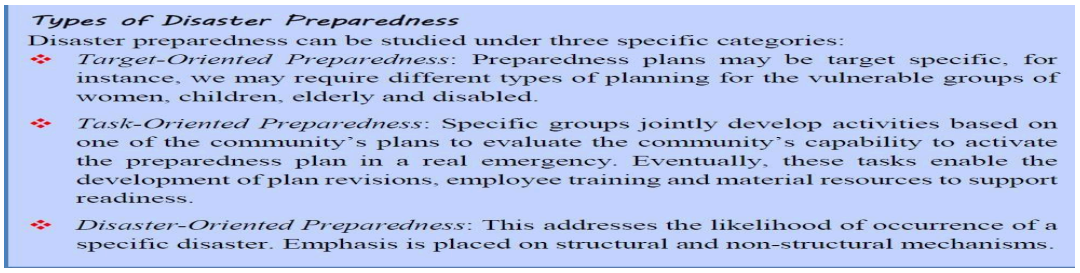
A hazard is a potential source of harm or adverse effects on individuals, property, or the environment. Natural hazards include earthquakes, floods, hurricanes, and wildfires, while human-made hazards encompass industrial accidents, chemical spills, nuclear incidents, and terrorist attacks. Both types pose significant risks to communities and ecosystems.

4. UNDP Manual, Module 2 "Vulnerability Assessment"; Sulphey, Ch.2 "Disaster Risk Concepts" page-28–35

In the context of disasters, vulnerability refers to the susceptibility of individuals, communities, or systems to harm when exposed to hazards. It encompasses various factors, including socio-economic conditions, physical characteristics, and preparedness levels, which influence the ability to withstand, adapt to, and recover from adverse events. Vulnerability is shaped by aspects such as poverty, infrastructure quality, access to resources, and social networks, determining the extent of impact a disaster may have. Addressing vulnerability is essential for effective disaster risk reduction and enhancing resilience within communities.

5. Sulphey, Ch.4 "Preparedness and Planning"; UNDP Manual, Module 3 -page 45–52

Disaster preparedness involves the knowledge and practices developed by governments,communities and recovery organisations for effectively responding and recovering from the impacts of hazard.



Types of Disaster Preparedness

Disaster preparedness can be studied under three specific categories:

- *Target-Oriented Preparedness*: Preparedness plans may be target specific, for instance, we may require different types of planning for the vulnerable groups of women, children, elderly and disabled.
- *Task-Oriented Preparedness*: Specific groups jointly develop activities based on one of the community's plans to evaluate the community's capability to activate the preparedness plan in a real emergency. Eventually, these tasks enable the development of plan revisions, employee training and material resources to support readiness.
- *Disaster-Oriented Preparedness*: This addresses the likelihood of occurrence of a specific disaster. Emphasis is placed on structural and non-structural mechanisms.

6. [R. Subramanian, Ch.5 "Response, Relief and Rehabilitation"-page 70–75]

Relief refers to the provision of essential, appropriate and timely humanitarian assistance to those affected by a disaster.It is defined as the provision of assistance during or immediately after a disaster to meet the life preservation and basic needs of those people affected.Relief, as a disaster management process, provides timely essential needs such as basic household items, shelter, food, water and sanitation, or health items.Relief activities provide goods and services to disaster-affected populations in the form of supplies, vouchers or cash transfers, so as to enable those populations to cover their essential needs. Relief measures differ, depending upon the nature of disaster. At certain occasions, money may have no value, but certain articles like food, clothes, etc. may be more important.

7. [UNDP Manual, Module 4 "Psychosocial Support"; Sulphey, Ch.5 80–85]

Crisis counseling is vital after a disaster as it provides immediate emotional support, helping individuals cope with acute trauma and distress. It addresses urgent psychological needs, fosters stabilization, and connects survivors to necessary resources.

Regular counseling, which focuses on long-term personal issues and therapeutic processes, crisis counseling is time-sensitive and specifically designed to respond to the immediate impacts of trauma, emphasizing rapid intervention to facilitate recovery and resilience in affected individuals.

8. [Sulphey, Ch.6 “Communication and Coordination in Disasters”; UNDP Manual, Module 5-page 90–96]
Effective communication in disaster management is crucial for ensuring timely dissemination of information, coordinating response efforts, and keeping communities informed. It helps establish trust among stakeholders, facilitates the flow of critical updates during emergencies, and guides public behavior for safety. Clear communication also enhances collaboration among agencies, reduces misinformation, and allows for rapid assessment of needs and resources. Ultimately, strong communication strategies can significantly improve preparedness, response, and recovery outcomes, saving lives and minimizing the impact of disasters.

9. [R. Subramanian, Ch.7 “Institutional Framework”; UNDP Manual, Module 6-page 110–120]
Local governments play a vital role in implementing disaster management legislation in India by coordinating response efforts, conducting risk assessments, and developing localized disaster management plans. They engage communities in preparedness activities, ensure compliance with safety regulations, and facilitate training programs. By working closely with District Disaster Management Authorities, local governments enhance grassroots resilience and response capabilities, fostering community awareness and participation in disaster risk reduction initiatives, which are essential for effective disaster management
[
10. R. Subramanian, Ch.3 “Natural Hazards”-page 26–30]
Tsunamis are large, powerful ocean waves typically caused by underwater disturbances, such as earthquakes, volcanic eruptions, or landslides. When tectonic plates shift abruptly, they displace vast amounts of water, creating waves that can travel at high speeds across the ocean. As these waves approach shallow coastal areas, their height increases, leading to devastating impacts upon landfall. Tsunamis can cause significant destruction, flooding, and loss of life, making early warning systems and preparedness crucial in vulnerable regions.

11. [R. Subramanian, Appendix/Ch. on Climate and Disasters-page 35–38]

- A) The term monsoon has been derived from the Arabic word **mausin** or from the Malayan word **monsin** meaning **‘season’.** Monsoons are seasonal winds (Rhythmic wind movements)(Periodic Winds) which reverse their direction with the change of season. The monsoon is a double system of seasonal winds – They flow from sea to land during the summer and from land to sea during winter. Some scholars tend to treat the monsoon winds as land and sea breeze on a large scale. Monsoons are peculiar to Indian Subcontinent, South East Asia, parts of Central Western Africa. They are more pronounced in the Indian Subcontinent compared to any other region.
- Indian Monsoons are Convection cells on a very large scale.They are periodic or secondary winds which seasonal reversal in wind direction.
- **India receives south-west monsoon winds in summer and north-east monsoon winds in winter.**
- **South-west monsoons are formed due to intense low pressure system formed over the Tibetan plateau.**
- **North-east monsoons are associated with high pressure cells over Tibetan and Siberian plateaus**.**South-west monsoons bring intense rainfall to most of the regions in India and north-east monsoons bring rainfall to mainly south-eastern coast of India (Southern coast of Seemandhra and the coast of Tamil Nadu.).**
  Factors responsible for south-west monsoon formation
- *Intense heating of Tibetan plateau during summer months.*
- *Permanent high pressure cell in the South Indian Ocean (east to north-east of Madagascar in summer).*
- Subtropical Jet Stream (STJ).

- Tropical Easterly Jet (African Easterly Jet).
- Inter Tropical Convergence Zone.

Factors that influence the intensity of south-west monsoons

- *Strengths of Low pressure over Tibet and high pressure over southern Indian Ocean.*
- *Somali Jet (Findlater Jet).*
- *Somali Current (Findlater Current).*
- *Indian Ocean branch of Walker Cell.*
- *Indian Ocean Dipole.*
- Formation and strengthening of high pressure cells over Tibetan plateau and Siberian Plateau in winter.
- Westward migration and subsequent weakening of high pressure cell in the Southern Indian Ocean.
- Migration of ITCZ to the south of India.
- All these will be discussed in detail.

Mechanism of Indian Monsoons Classical Theory

Indian Monsoons – Classical Theory: Sir Edmund Halley's Theory

Summer Monsoon

- In summer the sun's apparent path is vertically over the Tropic of Cancer resulting in high temperature and low pressure in Central Asia.
- The pressure is sufficiently high over Arabian Sea and Bay of Bengal. Hence winds flowed from Oceans flow towards landmass in summer.
- This air flow from sea to land bring heavy rainfall to the Indian subcontinent.

Winter Monsoon

- In winter the sun's apparent path is vertically over the Tropic of Capricorn.
- The north western part of India grows colder than Arabian Sea and Bay of Bengal and the flow of the monsoon is reversed.
- The basic idea behind Classical theory is similar to land and sea breeze formation except that in the case of monsoons the day and night are replaced by summer and winter.
  Drawbacks: The monsoons do not develop equally everywhere on earth and the thermal concept of Halley fails to explain the intricacies of the monsoons such as the **sudden burst** of monsoons, **delay** in on set of monsoons sometimes, etc..

11.[Sulphey, Ch.2 "Environmental Disasters"; UNDP Manual Module 7-page 55–60]

B) A greenhouse is a house made of glass that can be used to grow plants. The sun's radiations warm the plants and the air inside the greenhouse. The heat trapped inside can't escape out and warms the greenhouse which is essential for the growth of the plants.

Same is the case in the earth's atmosphere. During the day the sun heats up the earth's atmosphere. At night, when the earth cools down the heat is radiated back into the atmosphere. During this process, the heat is absorbed by the greenhouse gases in the earth's atmosphere. This is what makes the surface of the earth warmer that makes the survival of living beings on earth possible.

However, due to the increased levels of greenhouse gases, the temperature of the earth has increased considerably. This has led to several drastic effects.

Let us have a look at the greenhouse gases and the causes and consequences of greenhouse effects.

Greenhouse gases are the gases that absorb the infrared radiations and create a greenhouse effect. For e.g., carbondioxide and chlorofluorocarbons."

EFFECTS OF GREENHOUSE EFFECT

The main effects of increased greenhouse gases are:

- *Global warming*

It is the phenomenon of a gradual increase in the average temperature of the Earth's atmosphere. The main cause for this environmental issue is the increased volumes of greenhouse gases such as carbon dioxide and methane released by the burning of fossil fuels, emissions from the vehicles, industries and other human activities.

- *Depletion of ozone layer*

Ozone Layer protects the earth from harmful ultraviolet rays from the sun. It is found in the upper regions of the stratosphere. The depletion of the ozone layer results in the entry of the harmful UV rays to the earth's surface that might lead to skin cancer and can also change the climate drastically.

The major cause of this phenomenon is the accumulation of natural greenhouse gases including chlorofluorocarbons, carbon dioxide, methane, etc.

- *Smog and air pollution*

Smog is formed by the combination of smoke and fog. It can be caused both by natural means and man- made activities.

In general, smog is generally formed by the accumulation of more greenhouse gases including nitrogen and sulfur oxides. The major contributors to the formation of smog are the automobile and industrial emissions, agricultural fires, natural forest fires and the reaction of these chemicals among themselves.

- *Acidification of water bodies*

Increase in the total amount of greenhouse gases in the air has turned most of the world's water bodies acidic. The greenhouse gases mix with the rainwater and fall as acid rain. This leads to the acidification of water bodies.

Also, the rainwater carries the contaminants along with it and falls into the river, streams and lakes thereby causing their acidification.

- *Runaway greenhouse effect*

This phenomenon occurs when the planet absorbs more radiations than it can radiate back. Thus, the heat lost from the earth's surface is less and the temperature of the planet keeps rising. Scientists believe that this phenomenon took place on the surface of Venus billions of years ago.This phenomenon is believed to have occurred in the following manner:A runaway greenhouse effect arises when the temperature of a planet rises to a level of the boiling point of water. As a result, all the water from the oceans converts into water vapour, which traps more heat coming from the sun and further increases the planet's temperature. This eventually accelerates the greenhouse effect. This is also called the "positive feedback loop".

12. [UNDP Manual, Modules 2 & 3; Sulphey, Ch.3–4-page 40–55]

- A)Disaster Risk Management- Disaster risk management is the application of disaster risk reduction policies and strategies to prevent new disaster risk, reduce existing disaster risk and manage residual risk, contributing to the strengtheningof resilience and reduction of disaster losses.
- B)CRISIS COUNSELLING- Process of eliminating the emotional and psychological disturbances of people, affected by a disaster
- It can be carried out by psycho educational counselling classes.

- It is a crucial part of recovery and reconstruction.
- It enables people to take right decisions.
- C)EXPOSURE- It is the situation of people, infrastructure, housing, production capacities and other tangible human assets located in hazard-prone areas.
- Exposure changes over time and from place to place.
- As more people and assets are exposed, risk in these areas becomes more concentrated.
- If global exposure continues to trend upwards, it may increase disaster risk to dangerous levels.
- D)EARLY WARNING SYSTEMS- EWS is a socio-technical system designed to generate and circulate meaningful warning information in a timely manner to take a proactive response to a hazardous threat in order to avoid disaster or reduce its impacts.
- It is an integrated communication systems to help communities prepare for hazardous climate- related events.
- A successful EWS saves lives and jobs, land and infrastructures and supports long-term sustainability.
- Early warning systems will assist public officials and administrators in their planning, saving money in the long run and protecting economies.
- E)DAMAGE ASSESSMENT- Damage Assessment is the process for determining the nature and extent of the loss, suffering, and/or harm to the community resulting from a natural, accidental or human- caused disaster.
- Damages are normally classified as:
- **Severe:** The target facility or object cannot be used for its intended purpose. Complete reconstruction is required.
- **Moderate:** The target facility or object cannot be used effectively for its intended purpose unless major repairs are made.
- **Light:** The target facility or object can be used for intended purpose but minor repairs would be necessary.
- F)RESLIENCE- Ability of individuals, communities, organisations and states to adapt to and recover from hazards, shocks or stresses without compromising long-term prospects for development.
- It is opposite to vulnerability.
- Resilience is a term shared by many disciplines (e.g. psychology, engineering and ecology) and has been used in disaster studies since the 1970s.
- Resilience also emphasizes the importance of not only effectively managing change but also improving well-being in the face of multiple risks and shocks.
- There are different types of resilience that we need to develop in order to support ourselves during challenging times. These include **physical resilience, mental resilience, emotional resilience and social resilience**.
- G)NEEDS ASSESSMENT- Needs assessment is a process of estimating the financial, technical, and human resources needed to implement the agreed-upon programmes of recovery, reconstruction, and risk management.
- The Post-Disaster Needs Assessment (PDNA) is an internationally accepted methodology for determining the physical damages, economic losses, and costs of meeting recovery needs after a natural disaster through

a government-led process.

13. [UNDP Manual, Module 2 “Vulnerability and Capacity Assessment”-page 25–35]

- A) Vulnerability is **the inability to resist a hazard or to respond when a disaster has occurred**. For eg:, people who live on plains are more vulnerable to floods than people who live higher up. It the degree to which a system is exposed and susceptible to adverse effect of a given hazard Vulnerability = Exposure + Resistance + Resilience.
- Exposure: property and population at risk
- Resistance : measures taken to prevent, avoid or reduce loss
- Resilience: ability to recover prior state or achieve post disaster state.

Types of Vulnerability:

- There are mainly 4 types of vulnerability, they are:

  1) Physical Vulnerability
  2) Social Vulnerability
  3) Economic Vulnerability
  4) Ecological or environmental vulnerability

1) Physical Vulnerability

- This refers to the potential losses to the physical infrastructure such as roads, bridges, railways, radio and telecommunication mast and other features in the built environment.
- It also includes impacts on human population, in terms of injuries or death.
- In short, the vulnerability which occurs physically to property and lives is known as physical vulnerability.

2) Social Vulnerability

- Social vulnerability refers to the losses experienced by the people and their social, economic and political systems.
- It refers to the extent to which, elements of the society such as children, aged, pregnant and lactating women, single parents, family systems, social systems, caste ,gender, cultural values etc.. Will degrade after being exposed to a hazardous condition.

3) Economic Vulnerability

- Refers to the potential impacts of hazards on economic assets and processes and also includes vulnerability of different economic sections.

4) Ecological / Environmental Vulnerability

- Refers to the degree of loss that an ecosystem will sustain to its structure, function and composition as a result of exposure to a hazardous condition.

Vulnerability Assessment

- Vulnerability assessment is the process of assessing degree of loss.
- Variation exist in the method of assessing vulnerability, based on the following factors.

  1) Type of vulnerability being measured.
  2) Scale at which the vulnerability is measured.
  3) Type of hazard.

Types of vulnerability assessment:

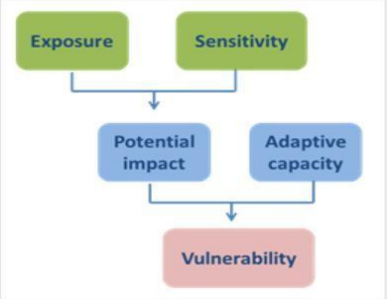
1) Physical vulnerability assessment
2) Socio economic vulnerability assessment
3) Environmental or ecological vulnerability assessment

1) Physical vulnerability assessment:

- There are many ways to assess physical vulnerability.
- Two main methods are empirical method and analytical method.
- Empirical method can be applied to groups of related structures.
- Analytical method are based on the use of geotechnical engineering software and are limited to individual structures.

2) Socio-Economic vulnerability assessment.

- Socio-economic vulnerability is indicator based.
- It can be assessed by analysing the level of exposure and coping mechanisms of individuals, households and communities.
- **ecological or environmental vulnerability assessment:**
- The environmental vulnerability assessment is used for the comprehensive evaluation of the resource system affected by natural conditions and intervened by human activities



13. R. Subramanian, Ch.4 "Disaster Risk Mapping"-page pp. 60–64]

B) **Applications of Hazard Maps:**

- **Spatial planning**: Hazard maps provide a basis for communal and district spatial planning processes
- **Risk reduction measures**: Hazard maps assist in the localisation and dimensioning of hazard protection measures.
- **Emergency planning**: Hazard maps indicate where the biggest risks arise and the events most likely to occur. This information can be used as a source of orientation in emergency planning.
- **Raising awareness among the population:** Hazard maps help to demonstrate potential risks to the population and to increase awareness of eventual protective measures.

14. [Sulphey, Ch.4 "Risk Analysis and Assessment" -page 50–55]

Risk Assessment Methods:

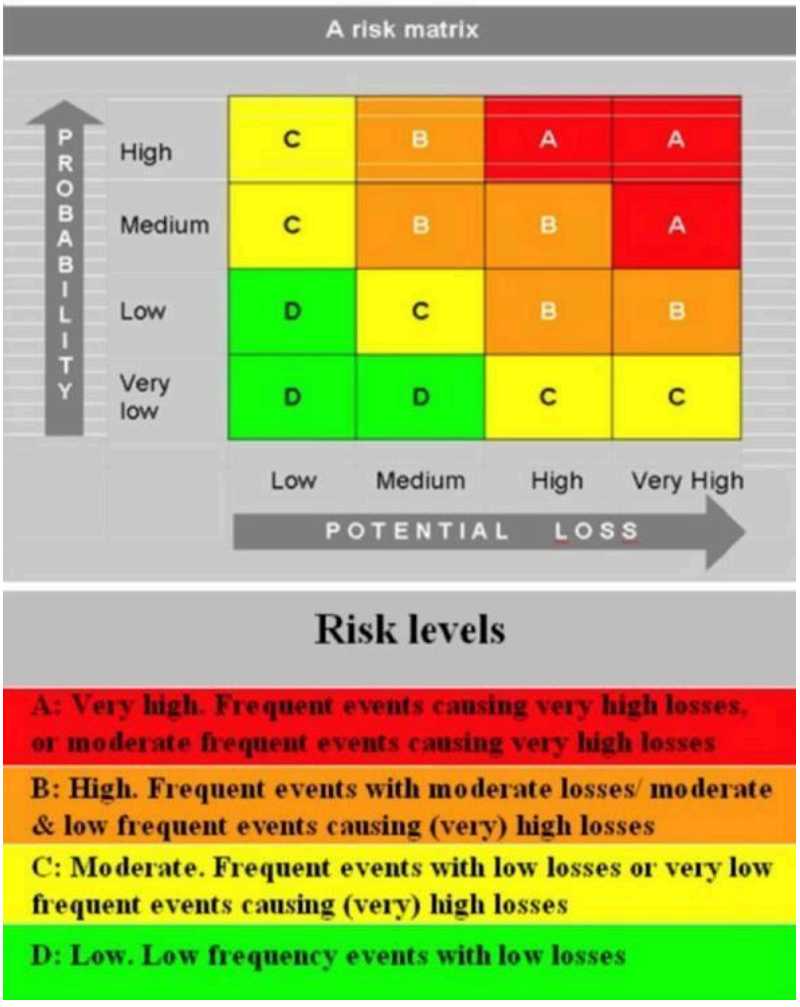
1) Qualitative methods

2) Semi –quantitative methods

3) Quantitative methods.

1) Qualitative Risk Assessment

- This involves qualitative descriptions of risk in terms of high, moderate and low.
- These are used when the hazard information does not allow us to express the probability of occurrence, or it is not possible to estimate the magnitude.
- This approach has widespread application in the profiling of vulnerability using participatory methodologies.
- Risk matrices can be constructed to show qualitative risk.
- A risk matrix shows on its y-axis probability of an event occurring, while on the x- axis potential loss.



2) Semi-Quantitative Risk Assessment.

- These techniques express risk in terms of numerical values.
- Ranging between 0 and 1
- They do not have a direct meaning of expected losses; they are merely relative indications of risk.
- The semi quantitative estimation for risk assessment is found useful in the following situations:
  - As an initial screening process to identify hazards and risks

- When the level of risk (pre-assumed) does not justify the time and effort
- Where the possibility of obtaining numerical data is limited

- The semi-quantitative approach could be adapted to cover larger areas.

3) Quantitative methods.

- This aims at estimating the spatial and temporal probability of risk and its magnitude.

- In this method, the combined effects, in terms of losses for all possible scenarios that might occur, are calculated.
- The equation given above is not only a conceptual one, but can also be actually

> Risk = Hazard * Vulnerability * Amount of elements-at- risk

calculated with spatial data in a GIS to quantify risk from hazards.

- The hazard component in the equation actually refers to the probability of occurrence of a hazardous phenomenon with a given intensity within a specified period of time.

15. [R. Subramanian, Ch.5 “Response and Relief”-page 70–80]

A) Disaster responses are the set of activities taken during a disaster or immediately following a disaster, directed towards saving life and protecting property.
The activities that deal with the effect of disaster may include medical care, evacuation, Search and rescue, provision of emergency water, food and shelter, debris removal and stabilisation of unsafe buildings and landforms.
It is the second phase of the disaster management cycle.

 Objectives of Disaster Response:

- Aimed at providing immediate assistance to maintain life, improve health and support the affected population.
- Focused at meeting the basic needs of the people until more permanent and sustainable solutions can be found.
- Preparedness for the first and immediate response is referred to as “emergency preparedness”

 Factors affecting Disaster Response:

 Factors affecting Disaster Response:

- The type of disaster
- The ability to take pre-impact actions
- The severity and magnitude of disaster
- The capability of sustained operations
- Identification of likely response requirements

 Requirements for Effective Response

- Information and resources are two essential requirements for effective response.

a) Information

- An **early warning system provides** vital information for effective response operation despite the unpredictability of some disaster events.
- An effective warning system must be robust to transmit warnings as early as practicable.
- Information gained from these systems could help in the planning and decision making as well as inform the general public.

b) Resources

- **Resources form an essential component** of disaster response.
- The need for disaster management organisations to be resource ready cannot be over emphasised considering the untimely occurrence of disasters, which most often is on short notice.
- The ability to mobilise the needed resources on short notice is most often hampered by many factors. Its effect on systems gives little room for procrastination of actions.

TYPES OF RESPONSES (IMP)

Disaster response actions are classified into 10 types:

1. Search and rescue
2. First aid and emergency medical care
3. Evacuation
4. Evacuation centre management
5. Development of Standard Operation Procedure (SOPs)
6. Immediate repair of community facilities and services
7. Relief Aid
8. Coordination and Communication
9. Psycho-social counselling and stress debriefing
10. Medical services.

15 [UNDP Manual, Module 5 "International Coordination"; Sulphey, Appendix-page 85–90]

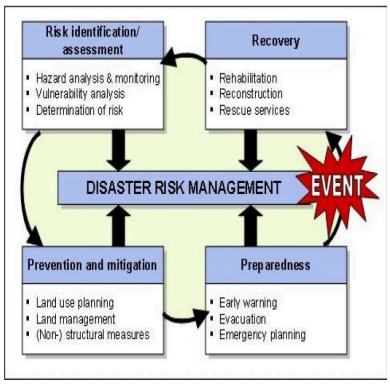
- B) Action Against Hunger (AAH),
- Catholic Relief Services, (CRS - USCC),
- Food For The Hungry International (FHI),
- International Committee of the Red Cross (ICRC),
- International Federation of Red Cross and Red Crescent Societies (IFRC)
- International Organisation For Migration (IOM)
- International Rescue Committee (IRC),
- Save the Children
- United Nations International Children's Emergency Fund (UNICEF),
- United Nations High Commissioner for Refugees(UNHCR),
- United Nations Office for the Coordination of Humanitarian Affairs(UNOCHA),
- US Committee for Refugees (USCR),

16. [UNDP Manual, Module 1; R. Subramanian, Ch.2- 15–22]

A) **Disaster Risk Management Framework**
In this framework, the disaster risk management process (cycle) comprises the following main elements:

1. Risk Identification and assessment
2. Prevention and Mitigation.

3. Preparedness.
4. Recovery



1. **Risk identification and assessment:** This involves determining and analysing the potential, origin, characteristics and behaviour of the hazard – e.g. frequency of occurrence/magnitude of consequences.
2. **Application of risk reduction measures in mitigation**: Planning and implementation of structural interventions (e.g. dams, sea defence) or non-structural measures such as disaster legislation.
3. **Disaster preparedness and emergency management:** Activities and measures taken in advance to ensure effective response to the impact of a hazard, including measures related to timely and effective warnings as well as evacuation and emergency planning.
4. **Recovery/Reconstruction:** Decisions and actions taken in the post-disaster phase with a view to restoring the living conditions of the affected population.

16. [R. Subramanian, Ch.5-page- 73–78]

B) Disaster response actions are classified into 10 types:

1. Search and rescue
2. First aid and emergency medical care
3. Evacuation
4. Evacuation centre management
5. Development of Standard Operation Procedure (SOPs)
6. Immediate repair of community facilities and services
7. Relief Aid
8. Coordination and Communication
9. Psycho-social counselling and stress debriefing
10. Medical services.

17. [UNDP Manual, Module 6 "Community Participation"; Sulphey, Ch.6-page 100–108]

1. A) **Why is participatory stakeholder engagement important in disaster risk management? Provide examples.**

- Stakeholder **'participation'**, stakeholder '**engagement' is the** interactions between two or more

stakeholders in policy making, development projects, organisational management and decision making in disaster risk reduction (DRR) education.

- In brief, 'stakeholder participation' is the involvement of interest groups in a planning or decision-making process.
- Participatory development is defined as a process in which people are proactively and significantly involved in all decision-making processes that affect their lives.

 TYPES OR FORMS OF STAKEHOLDER PARTICIPATION (imp)

The three basic forms of stakeholders are:

1) Primary stakeholder
2) Secondary stakeholder
3) Key stakeholder

1) PRIMARY STAKEHOLDER:

- Beneficiaries of a development intervention.
- People who are directly affected by a disaster.
- In disaster risk reduction, these stakeholders include: homeowners, renters, homeless persons and community-based small-scale businesses.

2) SECONDARY STAKEHOLDER

- Refer to those who indirectly influence a development intervention.
- They include the government, line ministry and project staff, implementing agencies, local governments, civil society based organisations, private sector firms, and other development agencies.

3) KEY STAKEHOLDER

- This group can significantly or directly influence a development intervention
- This groups are important to the success of the project through financial resources or power.
- E.g.: National Disaster Management Organisation (NADMO)

  Ministry of Local Government and Rural Development (MLGRD),

17. [UNDP Manual, Module 7 "Capacity Development"; R. Subramanian, Ch.8-page 115–125]

- B) Capacity building is an ongoing process that equips officials, stakeholders and the community to perform their functions in a better manner during a crisis/disaster.
- In the process of capacity building, we must include elements of human resource development, i.e., individual training, organizational development such as improving the functioning of groups and organizations and institutional development.
- At the national level, The National Institute of Disaster Management (NIDM) is the capacity building arm.
- The States have disaster management cells in the State Administrative Training Institutes performs the function of capacity building for effective and efficient disaster management. **Structural measures** are any physical construction to reduce or avoid possible impacts of hazards.
- It is the application of engineering techniques or technology to achieve hazard resistance and resilience in structures or systems.
- Common structural measures for disaster risk reduction include dams, flood levies, ocean wave barriers, earthquake-resistant construction and evacuation shelters.
- **Non-structural measures** are measures not involving physical construction which use knowledge, practice or agreement to reduce disaster risks and impacts, in particular through

policies and laws, public awareness raising, training and education.
Common non-structural measures include building codes, land-use planning laws and their enforcement, research and assessment, information resources and public awareness programmes

18. [UNDP Manual, Module 6 "Community Participation"; Sulphey, Ch.6-page 100–108]

- A) Stakeholder **'participation'**, stakeholder '**engagement' is the** interactions between two or more stakeholders in policy making, development projects, organisational management and decision making in disaster risk reduction (DRR) education.
- In brief, 'stakeholder participation' is the involvement of interest groups in a planning or decision-making process.
- Participatory development is defined as a process in which people are proactively and significantly involved in all decision-making processes that affect their lives.

 TYPES OR FORMS OF STAKEHOLDER PARTICIPATION (imp)

The three basic forms of stakeholders are:

4) Primary stakeholder

5) Secondary stakeholder

6) Key stakeholder

4) PRIMARY STAKEHOLDER:

- Beneficiaries of a development intervention.
- People who are directly affected by a disaster.
- In disaster risk reduction, these stakeholders include: homeowners, renters, homeless persons and community-based small-scale businesses.

5) SECONDARY STAKEHOLDER

- Refer to those who indirectly influence a development intervention.
- They include the government, line ministry and project staff, implementing agencies, local governments, civil society based organisations, private sector firms, and other development agencies.

6) KEY STAKEHOLDER

- This group can significantly or directly influence a development intervention
- This groups are important to the success of the project through financial resources or power.
- E.g.: National Disaster Management Organisation (NADMO)

  Ministry of Local Government and Rural Development (MLGRD),

18. Sulphey, Ch.6 "Communication and Coordination in Disasters"; UNDP Manual, Module 5[page 90-96]

- B) Communication is the act of transmitting information verbally or non-verbally.
- Communication is more than exchanging information; it's about **understanding the emotions and intentions behind information.**

 BASIC STEPS IN COMMUNICATION :

1. Forming of communicative intent
2. Message composition

3. Message encoding
4. Transmission of signals
5. Reception of signals
6. Message decoding
7. Interpretation

- *IMPORTANCE OF COMMUNICATION IN DRR*

1. Communication promote preparedness for disasters
2. Communications provide early warnings signals of disasters
3. Communication facilitates proper response to disasters

- *BARRIERS TO EFFECTIVE COMMUNICATION:*

1. **Non-Focus on the issue at hand**, not being attentive
2. **Avoid interruption**, show interest in what is being said
3. **Avoid being judgemental** but make provision for feedbacks
4. **Pay attention to non-verbal communication**
5. Be **conscious of individual differences**
6. **Keep stress in check but be assertive**

19. [UNDRR, *Sendai Framework* (All Sections); Sulphey, Ch.7 "Global Frameworks"-page-5–25]

A) The Sendai Framework on Disaster Risk Reduction (2015-2030) is an ambitious agreement that sets out the overall objective to substantially reduce disaster risk and losses in lives, livelihoods and health and in the economic, physical, social, cultural and environmental assets of persons, businesses, communities and countries.

It pursues the following **goal**: "Prevent new and reduce existing disaster risk through the implementation of integrated and inclusive economic, structural, legal, social, health, cultural, educational, environmental, technological, political and institutional measures that prevent and reduce hazard exposure and vulnerability to disaster, increase preparedness for response and recovery, and thus strengthen resilience."

- The seven global TARGETS are:

1. Substantially reduce global disaster mortality by 2030, aiming to lower average per 100,000 global mortality between 2020-2030 compared to 2005-2015.
2. Substantially reduce the number of affected people globally by 2030, aiming to lower the average global figure per 100,000 between 2020-2030 compared to 2005-2015. 7
3. Reduce direct disaster economic loss in relation to global gross domestic product (GDP) by 2030.
4. Substantially reduce disaster damage to critical infrastructure and disruption of basic services, among them health and educational facilities, including through developing their resilience by 2030.
5. Substantially increase the number of countries with national and local disaster risk reduction strategies by 2020.
6. Substantially enhance international cooperation to developing countries through adequate and sustainable support to complement their national actions for implementation of this framework by 2030.
7. Substantially increase the availability of and access to multi-hazard early warning systems and disaster risk information and assessments to the people by 2030.

GUIDING PRINCIPLES

The implementation of the present framework will be guided by the following principles, while taking into account national circumstances, and consistent with domestic laws as well as international obligations and commitments:

8. Each State has the primary responsibility to prevent and reduce disaster risk, including through international, regional, subregional, transboundary and bilateral cooperation. The reduction of disaster risk is a common

concern for all States and the extent to which developing countries are able to effectively enhance and implement national disaster risk reduction policies and measures in the context of their respective circumstances and capabilities can be further enhanced through the provision of sustainable international cooperation;

9. Disaster risk reduction requires that responsibilities be shared by central Governments and relevant national authorities, sectors and stakeholders, as appropriate to their national circumstances and system of governance;
10. Managing the risk of disasters is aimed at protecting persons and their property, health, livelihoods and productive assets, as well as cultural and environmental assets, while promoting and protecting all human rights, including the right to development;
11. Disaster risk reduction requires an all-of-society engagement and partnership. It also requires empowerment and inclusive, accessible and non - discriminatory participation, paying special attention to people disproportionately affected by disasters, especially the poorest. A gender, age, disability and cultural perspective in all policies and practices; and the promotion of women and youth leadership; in this context, special attention should be paid to the improvement of organized voluntary work of citizens;
12. Disaster risk reduction and management depends on coordination mechanisms within and across sectors and with relevant stakeholders at all levels, and. it requires the full engagement of all State institutions of an executive and legislative nature at national and local levels and a clear articulation of responsibilities across public and private

stakeholders, including business and academia, to ensure mutual outreach, partnership, complementarity in roles and accountability and follow-up;

13. While the enabling, guiding and coordinating role of national and federal State Governments remain essential, it is necessary to empower local authorities and local communities to reduce disaster risk, including through resources, incentives and decision-making responsibilities, as appropriate;
14. Disaster risk reduction requires a multi-hazard approach and inclusive risk-informed decision-making based on the open exchange and dissemination of disaggregated data, including by sex, age and disability, as well as on the easily accessible, up-to-date, comprehensible, science-based, non-sensitive risk information, complemented by traditional knowledge;
15. The development, strengthening and implementation of relevant policies, plans, practices and mechanisms need to aim at coherence, as appropriate, across sustainable development and growth, food security, health and safety, climate change and variability, environmental management and disaster risk reduction agendas. Disaster risk reduction is essential to achieve sustainable development;
16. While the drivers of disaster risk may be local, national, regional or global in scope, disaster risks have local and specific characteristics that must be understood for the determination of measures to reduce disaster risk;
17. Addressing underlying disaster risk factors through disaster riskinformed public and private investments are more cost-effective than primary reliance on post-disaster response and recovery, and contribute to sustainable development;
18. In the post-disaster recovery, rehabilitation and reconstruction phase it is critical to prevent the creation of and to reduce disaster risk by “Building Back Better” and increasing public education and awareness of disaster risk;
19. An effective and meaningful global partnership and the further strengthening of international cooperation, including the fulfilment of respective commitments of official development assistance by developed countries, are essential for effective disaster risk management;
20. Developing countries, in particular the least developed countries, small island developing States, landlocked developing countries and African countries, as well as middle-income and other countries facing specific disaster risk challenges need adequate, sustainable and timely provision of support, including through finance,

technology transfer and capacity-building from developed countries and partners tailored to their needs and priorities, as identified by them.

- PRIORITIES FOR ACTION

1. Understanding disaster risk

- The Convention stresses the importance of identifying potentially hazardous activities to be able to target actions for prevention, preparedness and response.
- It sets out preventive measures to be carried out by national authorities and operators, including legislative and institutional measures.
- The Convention also deals with the siting of hazardous installations as part of land- use planning policies and measures to minimize risks to the population and the environment.

2. Strengthening disaster risk governance to manage disaster risk

- The Convention provides a framework for Parties to set up their legal and institutional frameworks at local, national and regional levels to address the prevention of, preparedness for and response to industrial

accidents.

- It focuses on disaster risk reduction arising from hazardous activities which can cause a transboundary effect in case of accident.
- The Convention can be regarded as a mechanism for regional and subregional cooperation, as it addresses local and transboundary disaster risk reduction in case the consequences of an accident travel across borders and supports capacity development.

3. Investing in disaster risk reduction for resilience

- The Convention promotes the prevention of technological disaster risks through institutional, legislative and practical measures adopted by authorities and operators.
- This comes with an obligation to adopt legislation for disaster risk reduction, requiring operators of hazardous installations to ensure and demonstrate the safe performance of their activities.
- To ensure implementation of these measures, Parties need to include financial means as well.
- The Convention therefore also promotes coherence across sectors by stipulating cooperation among national authorities, which includes the private sector.
- Proper investments in all elements of DRR and industrial accident prevention are critical in order to strengthen resilience.

19. [R. Subramanian, Ch.7 "Institutional Framework"-page 110–120]

B)

Local governments in India play a pivotal role in the implementation of disaster management legislation, particularly under the framework established by the Disaster Management Act, 2005. They are responsible for formulating and executing district disaster management plans that align with state and national policies. This involves assessing local vulnerabilities, identifying risks, and developing strategies tailored to community needs.

Local authorities facilitate community awareness and preparedness programs, engaging citizens in training exercises and drills to enhance disaster readiness. They collaborate with various stakeholders, including NGOs, community groups, and educational institutions, to promote a culture of preparedness.

During disasters, local governments act as the first responders, managing evacuation processes, coordinating emergency services, and ensuring the efficient distribution of relief materials. They also play a crucial role in post-disaster recovery, helping communities rebuild and implement lessons learned to mitigate future risks.

Additionally, local governments monitor and evaluate disaster management activities, ensuring compliance with legislation and improving overall resilience. Their intimate knowledge of local contexts enables them to address specific challenges effectively, making them essential to the success of disaster management efforts in India.

20. [R. Subramanian, Ch.9 "National Policy and Planning"-page 130–138]

A) The National Disaster Management Policy of a country aims to provide a comprehensive framework for disaster risk reduction, preparedness, response, and recovery. It emphasizes a proactive approach to disaster management, integrating efforts across various sectors and levels of government. Key components include enhancing community resilience, promoting effective communication and coordination among agencies, and ensuring adequate training and resources for disaster response.

The policy also focuses on risk assessment and early warning systems to mitigate potential impacts of disasters. It encourages community participation and collaboration with non-governmental organizations to foster a culture of preparedness. Furthermore, the policy outlines roles and responsibilities for different stakeholders, ensuring a structured response during emergencies. Ultimately, it seeks to minimize the loss of life and property, safeguard livelihoods, and promote sustainable development in the face of natural and man-made disasters

i) Objectives Of National Disaster Management Policy

The objectives of the National Disaster Management Policy are designed to enhance the country's resilience against disasters. Key objectives include:

1. **Risk Reduction**: To identify and mitigate disaster risks through proactive measures and planning.
2. **Preparedness**: To ensure that communities and agencies are well-prepared for potential disasters, including training and resource allocation.
3. **Response and Recovery**: To establish efficient response mechanisms for effective disaster management, minimizing loss of life and property.
4. **Community Engagement**: To promote community participation in disaster management, fostering local ownership and resilience.
5. **Coordination**: To facilitate coordination among government agencies, NGOs, and the private sector for a unified disaster response.
6. **Capacity Building**: To enhance the skills and knowledge of personnel involved in disaster management through continuous training.
7. **Awareness and Education**: To raise public awareness about disaster risks and encourage preparedness through educational programs.

The National Disaster Management Policy comprises several key elements designed to ensure a comprehensive approach to disaster management:

8. **Prevention and Mitigation**: Strategies to reduce the risk of disasters and their impacts through infrastructure improvements and land-use planning.
9. **Preparedness**: Developing plans, training, and resources to ensure communities and agencies can effectively respond to disasters.
10. **Response**: Establishing a coordinated framework for emergency response, including communication protocols and resource allocation.
11. **Recovery**: Planning for post-disaster recovery to restore livelihoods and infrastructure while promoting resilience and sustainable development.
12. **Capacity Building**: Enhancing the skills and capabilities of individuals and organizations involved in disaster management through training and education.
13. **Community Participation**: Encouraging local involvement in disaster management processes to foster ownership and resilience.

14. **Monitoring and Evaluation**: Implementing systems to assess disaster risks and evaluate the effectiveness of policies and programs, ensuring continuous improvement.
15.

20 . [R. Subramanian, Ch.3 “Types of Disasters”; UNDP Manual, Module 1-page -18–30]
B) India is prone to a variety of natural and man-made disasters, influenced by its diverse geography and climatic conditions. The most common types include:

- **Floods**: Monsoon rains frequently lead to flooding, especially in states like Bihar, Assam, and Uttar Pradesh. These floods can cause extensive damage to infrastructure, agriculture, and homes.
- **Droughts**: Regions such as Rajasthan and parts of Maharashtra experience severe droughts, leading to water shortages and affecting crop yields. This has significant implications for food security and livelihoods.
- **Cyclones**: The eastern coastline, particularly along the Bay of Bengal, is vulnerable to tropical cyclones. These storms can bring high winds, heavy rainfall, and storm surges, leading to widespread destruction.
- **Earthquakes**: The northern and northeastern regions of India, especially near the Himalayas, are seismically active. Earthquakes can cause significant loss of life and property.
- **Landslides**: Hilly areas, particularly in the Western Ghats and the Himalayas, are prone to landslides, particularly during heavy rains. These can disrupt transportation and pose risks to communities.
- **Heatwaves**: Extreme heat events are common during the summer months, especially in northern and central India, leading to health risks and agricultural stress.
- **Industrial Accidents**: Chemical spills and gas leaks are concerns in industrial zones, which can have devastating impacts on local communities.
- **Fires**: Wildfires and urban fires pose significant risks, particularly in dry seasons.
- **Pandemics**: Health crises, such as the COVID-19 pandemic, have revealed vulnerabilities in public health systems.