

B.Tech - IV Semester Regular / Supplementary - ①
- Examinations, July 2021

Disaster Management
(Mechanical Engineering)

Part - A

All the following questions carry equal marks.

$$(10 \times 2M = 20M)$$

Q1) Distinguish hazard and vulnerability.

Hazard:— Environmental hazards are those components of the natural environment that have a potential to cause harm to life, property & environment, including a large number of fatalities. ex— ~~earthquakes, landslides, volcanoes~~

Vulnerability:— The degree of exposure to a hazard area/hazard or susceptible to disaster ex— It is higher when a city (or) village near to a river where the chance of floods is high.

Q2) List the characteristics of a Pandemic

A Pandemic is a global disease outbreak. A Pandemic occurs when a new virus emerges for which there is little (or) no immunity in the human population, begin →

to cause serious illness and then spread easily person-to-person worldwide.

characteristics :-

- i) There will be a rapid worldwide spread.
- ii) There will be a little or no immunity for that disease.
- iii) Health care systems will be overloaded.
- iv) Medical supplies will be inadequate.
- v) There will be economic & social disruption.

Q1 Write the goals of Disaster Management.

Goals of Disaster management are:-

- i) Put aim to reduce (or) avoid the potential loss from hazards.
- ii) Assure prompt & appropriate assistance to victims of disaster.
- iii) and achieve rapid and effective recovery.

Q2 Specify the importance of early warning systems.

Early warning system is a major element of disaster risk reduction. It can prevent loss of life and reduce the economic & material damage.

(2)

impacts of hazardous events including disaster.
ex- earthquake early warning system don't predict earthquake, instead the detect ground motion as soon as an earthquake begins & quickly send alerts that a tremor is on its way., giving people crucial seconds to prepare; it's a set of capacities needed to generate & disseminate timely & meaningful warning information of the possible extreme events (or) disaster (egf floods, fire, tsunamis etc.)

5. How does Capacity influence disaster?

Capacity refers to all the strengths, attributes and resources available within a community organization / society to manage & reduce disaster risks and strengthen resilience. It is an integral part of disaster preparedness & contributes to the creation of community based disaster preparedness programmes at the rural & urban-level; It helps the people in community to identify risky & prepare them in advance so the effect of disasters may be reduced. Concept of capacity building is important in managing the disasters effectively. →

6) State the difficulties of displaced Persons.

Disasters, when they occur would damage the lives of people and their property; loss of life will be higher/more if proper mitigation measures are not taken prior to disaster; persons who are displaced during disasters face lot of difficulties like → shortage of food & water
→ lack of shelter
→ unavailability of basic needs.
→ Non availability of communication.
→ Dwindl of communication.

7) List of the uses of safety plan in Industries.

work place safety is very important for any kind of industry, because workers desire to work in a safe & well protected environment.

The uses of safety plan are

- (i) Maintenance of good health of workers.
- (ii) To reduce the pollution, if any.
- (iii) To monitor climate change issues.
- (iv) It will help prevent harm to workers, property, environment & to the civil society.
- (v) It can avoid any kind of industrial accidents.

8) Is disaster relief, a priority? why?

Yes, disaster relief is very important stage of disaster management. It refers to financial

③

Physical help to people (or areas) hit by a disaster.
If there is no proper relief measures taken after disaster, they may face psychological after effects of disaster. It is important to deliver disaster aid to victims quickly not only to restores lost assets, but also maintains their mental health and it helps in coping up after disasters.

Q) State the objectives of disaster risk reduction -

- Plan.

Disaster Risk Reduction (DRR) aims to reduce the damage caused by natural hazards like floods, earthquakes, drought and cyclones; it is long-term national sectoral plan aiming to address four main priority areas of disaster prevention

i) mitigation

ii) preparedness

iii) response, rehabilitation & recovery

It helps in protecting the lives & livelihoods of communities & individuals during disasters.

(o) Name a few man made Disasters.

Disasters are of 2 types:- Natural disasters

(ii) Manmade (Anthropogenic)

Disasters that are the result of human activities are known as man made disasters.

example:- Mining accidents, explosions, acts of terrorism, train/ road accident, chemical spill, ground water contamination etc.

Part-B

Answer all the following questions $(5 \times 10 M = 50 M)$

- ii) Present a typical Case Scenario of man-made hazard, it's impact on environment and living beings.

Ans Anthropogenic hazards are the man made / man-produced hazards, caused by human activities - leading to loss of life and property as well as damage to a country's economy and productive capacity. They include environmental pollution, tellurism, destruction of property, widespread hunger, road & rail accidents, all caused by complex anthropogenic reactions.

Manmade hazards are of different types:-

- i) Physical hazard.
- ii) Technological hazard.
- iii) Industrial hazard.
- b) Structural collapse hazard.
- c) Nuclear "
- d) Transportation "
- (iii) Biological hazards
- e) Social Hazards.

Case Study:- one of the major man made industrial disaster in India in history is the Bhopal gas-tragedy at the Union Carbide Pesticide plant →

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- located in densely populated region in the city of -
 - Bhopal, Madhya Pradesh, on the night of 2nd & 3rd December, 1984 is the greatest chemical disaster in history.

A poisonous and highly toxic vapour of M.P.C. Methyl Isocyanide, burst from the tall stacks of the Pesticide plant, killing 2000 people immediately and injuring about three lakh people. In addition 1000 animal were killed and about 7000 were injured. Several studies have indicated that many of the survivors of the tragedy, even after five years, continued to suffer - from one or several health problems and ranging from one or complete blindness, permanent disability, Partial or complete deafness, gastro-intestinal disorders, impaired immune system, respiratory difficulties, cardiac failure, lung injury, trauma and stress disorders, menstrual problems in women, increase in spontaneous abortions, early birth, genetic defects in offsprings & other - health issues. It occurred because of improper method of manufacturing pesticides, insufficient maintenance of the plant; improper safety measures and lack of emergency response plan etc. that led to such worst man-made disaster ever in India.

12) Analyze the consequences of an earthquake with a real case scenario.

Ans Earthquakes are sudden violent movement of the earth's surface and even the tectonic plates of the ocean which may cause great damage (i.e. when the Richter Scale reads above 6) to life, property, livelihood, economy & environment.

India has experienced several destructive earthquakes of high intensity in the recent past. Some of the major earthquakes are:

- i) North East India - 2015
- ii) Himachal Pradesh - 2014
- iii) Sikkim - 2013.
- iv) J&K - 2013
- v) New Delhi - 2012
- vi) Gujarat - 2006.
- vii) Assam - 2021

The reason for the intensity and high frequency of earthquakes is the Indian tectonic plate driving into Asia at a rate of appo. 47mm/yr

Consequences of earthquakes are as follows:- on 15th January, 2021, an earthquake struck, on the Indonesian Island with a magnitude of 6.2; The consequences of →

The earthquake was more than 6000 structures were damaged and at least 111 people were dead and 3,300 were injured, while thousands of residents were replaced due to the earthquake.

Ground shaking is the most familiar effect of earthquake. It is the result of the passage of seismic waves through the ground; on 27th March, 1964 in Alaska, strong ground shaking lasted for as much as 7 minutes;

Ground rupture is another effect of strong earthquake. Damage to built environment such as buildings, transportation lines, bridges, communications lines & utility lines.

Land slides occur because of violent shaking of the ground, it includes mud flows, rock falls, avalanches etc. These are frequent in mountainous regions causing loss of life.

Tsunami, is a major hazard caused by earthquake. The seismic sea waves produce powerful ocean waves and cause devastation to life.

fires, socio-economic impacts, psychological shock also are the consequences of earthquakes.

(B) Discuss the various stages of an effective disaster-management mechanism.

A: Disaster management aims to reduce (or) avoid, the potential losses from hazards and achieve rapid and effective recovery.

The four disaster management phases illustrated as follows. The length of each phase greatly depends on the severity of the disaster.

1) Mitigation } Before disaster

2) Preparedness } During disaster

3) Response -

4) Recovery - After disaster.

1) Mitigation : It actually eliminate (or) reduce the probability of disaster occurrence. Or reduce the effects of unavoidable disasters through proactive measures taken before an emergency (as disaster occur).

2) Preparedness : It refers to measures taken to prepare for & reduce the effects of disasters. to save the maximum of loss the potential →

number of lives and property during ⁽⁶⁾ disaster.

3) Response:

The assistance provided lately after a disaster
It focuses on saving lives and protecting community-
-munity assistn;
- counseling

4) Recovery:

- i) Rehabilitation
- ii) Reconstruction.

Recovery activities continue until all the systems return to normal or better.
(i) Rebuilding damaged structures.
(ii) Relocation to safe places.

14) Give an account of mitigation measures and relief plans for various types of disasters.

for floods Mitigation measures taken to

Prevent floods are,
i) constructing dams which helps to control-

floods.

ii) embankments along the rivers help to minimize floods.

- iv) placing sand bags along the banks of river
- v) wetland should be protected as they act as a natural flood controlling system.
- vi) Afforestation prevents floods as the trees absorb water into the soil surface, preventing surface run-off

iii) Relief:- 1) Providing food & nutrition to the disaster affected people.

- 2) Providing dry ration for cooking.
- 3) First aid kit.
- 4) providing safe drinking water.
- 5) psycho-social support & mental health services to lower stress of victims.
- 6) Providing proper shelter.
- 7) setting up of relief camps with basic facilities.
- 8) Monitoring the hygiene and Sanitation services to the victims.

15) Describe the merits and limitations of various tools for damage assessment.

Following any major natural or man-made disaster, rapid monitoring & assessment of infra-

- structures and environmental damage are essential for successful rescue and relief operation. Latest - advances in active remote sensing technologies - such as Radar and LiDAR are very useful.

These technologies will not only help in saving lives but will also allow rescue & relief operations to be carried out smoothly and help the societies to get back to normal. Remote sensing technology has been used extensively to monitor changes in the landscape. whereas optical sensor; due to the medium to large spatial resolution of these sensors, their usability is also limited. For such cases active remote sensing data such as Light Detection and Ranging (LiDAR) can be used to resolve some of the limitations.

compared to passive remote sensor, active remote sensing technology has several advantages. Passive remote sensors are sensitive & dependent on solar illumination & limited by the time of day & weather conditions. & active remote sensors use their own energy to illuminate a surface on earth.



(6) Explain the possible risk reduction measures in -
hazardous gas leak from industries.

The hazardous gas leak from chemical-industries, construction industries are responsible for causing severe health effects and destroy natural environment.

It leads to

- i) damage to central nervous system.
- ii) metal poisoning.
- iii) skin allergies, cancer.
- iv) reproductive disorder etc

Measures) 1) Inventory Management → A reduction in the quantity of waste generation by proper control of materials used in the manufacturing process.

2) Alteration in the production process →

changing the materials used to make the products and proper training must be given to the workers to handle the procedure with care

3) Recovery & reuse of waste material

4) Proper labelling & storage of hazardous substances with proper care. →

(8)

- 5) Designing sustainable products, so that we can recycle & reuse them.
- 6) usage of PPE kits by the workers for their safety.
- 7) proper Isolation & segregation of hazardous-chemicals should be done.
- 8) usage proper exhaust ventilation.

(7) Give an account of the various essentials and their uses in an emergency survival kit.

Ans Survival kits are very important during emergency situations of any disaster; they provide basic resources needed to the victims of disaster.

essentials in survival kit :-

- 1) Pure drinking water.
- 2) non-perishable, easy-to-prepare food - items.
- 3) Flash light & Batteries.
- 4) Medications, first aid kit.
- 5) Sanitation & personal hygiene items.



- 6) cellphone with chargers for emergency communication purpose.
- 7) Emergency Blanket.

Consider the needs of all family members -
and add supplies to your kit,

- i) medical supplies
- ii) Baby supplies
- iii) Dry ration & Sanitation items.
- iv) Blankets
- v) Towels, gloves, extra clothing
- vi) Contact Information for family & friends
- vii) Hearing aids & other assistive devices.
- viii) plastic sheeting etc.

All these items are essential during emergency situation of disaster; these are provided by NDRF and NDMA by the central and state government;



Q1) Discuss the role of media in a global pandemic like Covid-19.

A: Media is a major source of information to the people in case of any emergency situations like disasters, pandemic etc. It serves as response communication in emergency.

a) To inform the people about the occurrence of disaster

b) To advise people about rescue actions to be taken.

c) To improve communication links among the disaster affected people

d) To encourage people to participate in rescue activities

e) To Publicize the necessity for assistance grants.

The digitization of the news media has enabled real-time analysis, for better management purposes. The electronic media can reach to every nook & corner of the world. The media →

can stimulate the international community for donations
- our and influence the central government to allocate sufficient funds for disaster response programs

Providing citizens with clear and right - information is the responsibility of media. The social media too has become an important tool during emergency situations. It helps in dissemination of information, spread awareness about the situation, collection of funds, food, emergency kits etc.

(g) Prepare a disaster management plan for a raging forest fire

wild fire, also called forest / bush fire, can be described as any uncontrolled and non-prescribed combustion (or) burning of plants in a natural - setting such as a forest, grassland etc
Causes
i) Natural Causes
ii) Man made Causes

i) Natural Causes :-
1) Lightning
2) High atmospheric temperatures.
3) Low humidity

ii) Man-made Causes :-
1) Fire caused when source of fire like flame, cigarette (or) electric spark

(10) (v) any source of ignition comes in to contact with inflammable material.

Taking into consideration the serious nature of the problem, it is necessary to make some major improvements in the forest fire management strategy, for the country. The ministry of environment and forests, Govt. of India, has prepared a National Master plan for forest fire control. This plan-

includes the following components.

- Prevention of human-caused fires through education and environmental modification.
- It will include engineering works, people participation, education & enforcement.
- People participation through joint forest fire management for fire prevention.
- Detection of forest fires through observation points, (ii) efficient ground patrolling and communication networks.
- Remote sensing technology is to be given importance in fire detection.
- Fire forecasting system to be developed in the country.

20) Enumerate the key features of disaster management policies in India. Add a note on recent policy updates.

Ans The National Disaster Management Act, 2005 was enacted by the Parliament with the consent of the President on January 9th, 2006. The Act consists of 79 sections and 11 chapters. The main objective of this Act is effective management of disasters and matters related to it; the key features of the Act are

- as follows:

- 1) Prevention of danger or threat of any disaster
- 2) Mitigation / reduction of risk of any disaster / its consequences.
- 3) Capacity building.
- 4) Preparedness to deal with any disaster
- 5) Evacuation, rescue & relief
- 6) Rehabilitation & Reconstruction.
- 7) Providing financial assistance to victims.

→ The End ←