

Attendance, Presentation

20 + 10/10

Midsem, Endsem

20 + 40

Quiz (2 of 3)

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(Umin SD) -ve marking

Random calling in presentation, No language barrier

Q Contribution in environmental degradation

- CO<sub>2</sub> generated during making electricity

- consume less so we are less responsible for environmental degradation

Cloud burst - When it rains a lot in a short span of time

Chombari glacier melted which caused flash flood leading to ~~costing~~ loss of life & property - in 2013.

Natural events - Not causing loss of life & property

e.g. flooding in forest

tsunami

Natural Hazard - causing loss of life & property, crops  
floods in cities

Q Picture may be given & we need to list the Vulnerability, Risk associated with image -

Risk function of hazard, exposure, vulnerability.

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to loss of life

Risk factor 1 is more at night as everyone is sleeping.

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- Asia is hardest hit because of climate change
- There are not significant increase in no. of earthquake, volcanic eruptions,
- But no. of storms, floods, heat wave have increased since 1950's due to climate change

Floods.

- when it rains &amp; river overflows

Flash floods - occurs when it rains suddenly.

Agriculture is effected due to flood as it causes soil erosion, and many more things

Drought

Due to droughts in Europe WW2 era bombs have resurfaced. China is also dealing with worst drought in 60 years.

Hurricane = Cyclone

Crops are lost  
disruption in electricity

~~Crops~~ Uprooting of trees - ~~then can be more problem~~

loss of plantation - major problem as trees take years to grow

degradation of land - as water logging can increase salination of land.  
roots get rot due to lack of aeration

Crops	Livestock	Fisheries	Forestry
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affected by

Floods	Drought	Tsunamis	Storms
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Storms

Hurricane

Droughts

cyclone

No. of Flood (35%) & Windstorm (22%) account for majority of disasters.

Drought (28%) Epidemic, famine, insects (19%)  
earthquake (14%)

### Effect of development

- loss of agricultural land

People affected by flood, earthquake etc think ~~that~~ Harry  
of things happened to them because they have sinned in past life.

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Loss of livestock - can cause loss of live loss of livelihood  
rise in price of dairy products.

It can be caused by spread of diseases, after cyclone, flood.

fishermen / Marginalised people living in temporary (mud) houses farmers live in disaster prone region as it is near their livelihood

As after floods land become better for crop growing

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## Human Induced Disasters

Ex why war happen - killing at head of state, to acquire more influence, acquire more resources.

Ex of war - Vietnam war, Korean war, US-IRAQ etc.

Holocaust - Mass killing of ~~6-7~~ 6-7 million Jews

### Environmental Impact of War

- ~~Before~~
- Before war we need resources to make tank, gun, nuclear weapon (marine ecology gets effected while testing submarine)
  - energy is required to run the army & build weapons

- detonation is done to acquire huge patch of land.
- military vehicles require fuel to run.

Effects

- High rise buildings, hospitals are destroyed.
- Water management system collapsed during war.
- Effect children
- disruption of family, death in family, mentally scarred for life.
- high risk that they get hurt.
- Children who ~~were~~ get separated by family are then pushed into child labour, child trafficking, ~~as~~ they are brain washed & sucked into militancy.
- Education may not get to them.

Gender based violence - Malaya Yusufzaya

Taliban said girls cannot go to school. Malaya objected & was shot in head. Then ~~UN~~ UN took care of afghanistan & she was rushed to hospital & saved ~~& given~~

- We have mastered how to utilize the resources for ~~our~~ survival & betterment of lifestyle.

### - Rohingya Issue

It has happened due to conflict between minority Muslim & majority Buddhist. UN has classified it as example of ethnic cleansing.

## Volcanic Eruption Natural Hazard

Lava is basic source of all minerals.

During volcanic eruption ~~there~~ <sup>water vapour</sup> is released.

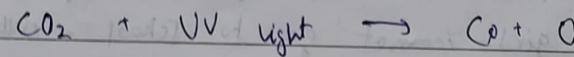
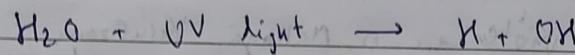
$H_2O$ ,  $CO_2$ ,  $SO_2$  are released.

& these water vapour formed the ocean.

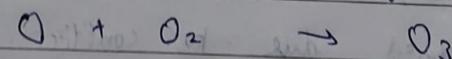
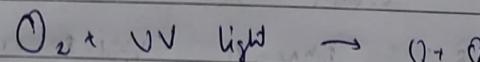
also  $CO$ ,  $HCl$ ,  $H_2S$ ,  $HF$ ,  $H_2$ ,  $N_2$  are also released.

$N_2$  78% And as  $N_2$  is inert in ~~the~~ nature its composition increased with time.

for  $O_2$



Now day UV light is trapped into stratosphere but previously ozone may not there.



So ozone formed

Before ozone life was there in oceans,

After ozone life on land start to build.

So plants, animals formed.

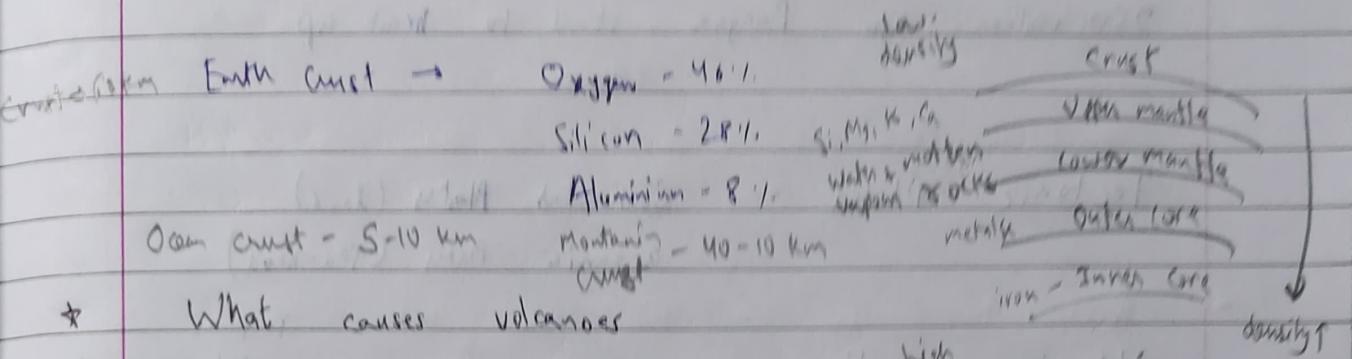
So after that plants are responsible for formation of oxygen.

## Atmosphere just below crust

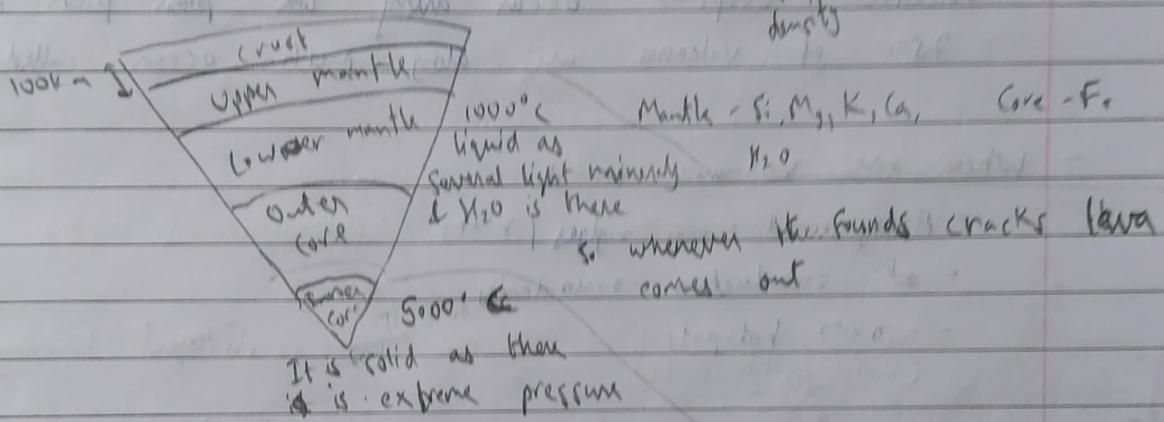
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Before humans plants thrived due to minerals left by volcanic eruptions.



### \* What causes volcanoes



Lava comes from mantle

Crust is brittle in nature as its thickness is less compared to other layers.

So whenever crack are formed, rift are produced if magma rises through ~~vents~~ vent

Inside earth it is magma

Outside earth it is lava

Temp  $\approx 1000^{\circ}\text{C}$

Along with lava, ashes, water vapour comes out

When ashes along with gases comes out it is called pyroclastic flow

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Pangaea

- 450 million years ago

(Continental Plates)  
starts to move

250 million ago Pangaea start to break up

Tectonic Plates - Continental Plates (land)

Oceanic Plates (sea-bed)

Volcanic eruption occurs along the plate boundaries  
 T.S. of volcanoes are along Pacific Ocean called ring of fire.

Where are Volcanoes found

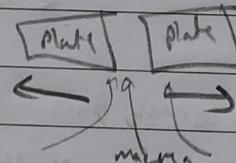
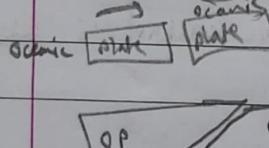
- Along mid ocean ridges / rifts 'plate boundaries'
- at subduction boundaries
- over hotspots  
(found within plate)

II

divergent boundary

Convergent boundary

③

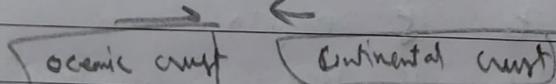


magma comes out to form new crust

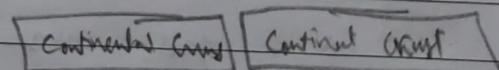
one plate comes up &amp; one plate goes down

(crust going down)

The oceanic crust which is denser will go down &amp; subduction happens



- Continental Plate comes up as it is less dense.
- & Oceanic Plate is destroyed as it goes down



The older the continental plate the denser it is so in CP-CP  
 subduction happens to older plate & older plate goes down

K is destroyed.

Volcanic activity happen in subduction zone  
it is related to convergent boundary

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## Wegener Continental Drift theory (1912)

Atlantic getting wider & Pacific getting smaller,  
Africa getting split into two.

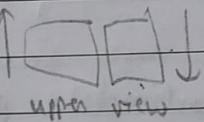
→ There are 7 major plates & 10 minor plates

Plates are above liquid mantle.

Each plate have continental crust & oceanic crust.

III

Transform boundary.



When two plates slide this causes earthquake.

## Pacific Ring of Fire.

most of these plate boundary are convergent in nature.  
Home to 75% of Volcanoes & 90% of earthquake.

About 1500 active volcanoes.

It is almost a ring containing most volcanoes along the boundary of Pacific Ocean so it is called Pacific ring of fire.

Mariana Trench is deepest point in earth. It is in Pacific Ocean. It is result of convergent plate boundaries.  
Also Mt. Everest is result of convergent plate activities.

## Divergent Plate Boundaries

- Mid ocean ridge - Under ocean there are long mountain chains
  - Atlantic getting wider
  - Africa splitting into two.
  - Rift boundaries can form rain fed river.  
Ex. east African rift valley, Galapagos island
  - Divergent in continental plate is called continental drift  
divergent in oceanic plate are called ridge.  
African plate will diverge causing Africa to split.
- Everest is 8848 m tall from sea level.
- Dolores Americans have proposed we should measure weight of mountain from bottom which can be below sea & said Hawaii was a mountain which is 10,000 m tall.

Along divergent plate boundary there is new crust.

& Atlantic is getting wider as we have a divergent plate boundary in between, causing ridges.

This won't spread forever & stop when compression starts to happen b/w two plates.

Volcano can happen on - continental crust (Along the  
- oceanic plate plate)  
- hotspot (inside plate)

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Why oceanic & continental volcano shape are different

Why we don't see conical volcano at mid ocean ridge.  
→ As when magma rises it comes in contact with water causing lava to cool off so height of mountain is not too high.

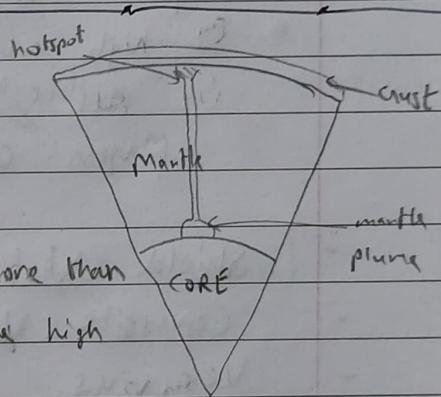
Whereas for volcanos on land lava doesn't cool that fast so we see conical shape volcano.

They make  
NPF  
valley

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### Intraplate (hot-spot) Volcanism

When temp in mantle plume increases more than normal mantle plume is formed which has high pressure & thus hotspots are formed.



Mantle plumes are at some place but the crust keeps on moving, so using mantle plume hill ranges are formed.

Proof that tectonic plate going toward northwest direction.

Ex. Hawaii

Yellowstone geyser

Mountains, molten are formed due to hotspots.  
(Chain of islands)

Dinosaurs went extinct due to volcanic eruptions. At these eruptions release toxic fumes,  $\text{SO}_2$ . This  $\text{SO}_2$  combined with clouds to form acid rain causing extinction of dinosaurs. These eruption happened for 1000's of years.

65 million years ago mass extinction  
occurred of dinosaurs due to volcanic

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activities

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- The plants died so herbivores died then the carnivores died.
  - Ashes blocked sun rays killing natural vegetation
  - Temp of earth surface decreased by  $26^{\circ}\text{C}$   
This happened for 1000's of years killing many species.

Volcanic Eruption :- Explosive -

- Effusive

This depends on magma chemistry.

- Magma having high silica are explosive in nature
- High silica magma block pipes of volcanoes causing explosion.

Magma chemistry  $\rightarrow$  learn all three types.

- Shield Volcanoes
- Composite Volcanoes.
- Vesuvius - eruption took place in 79 AD as emilian plate & African plate collided. Buring alive people of pompeii

Volcano affecting climate

- Causes loss of vegetation as acid rains are caused

Advantage of volcanic eruption.

- Volcanic eruption provides highly nutritive soil.

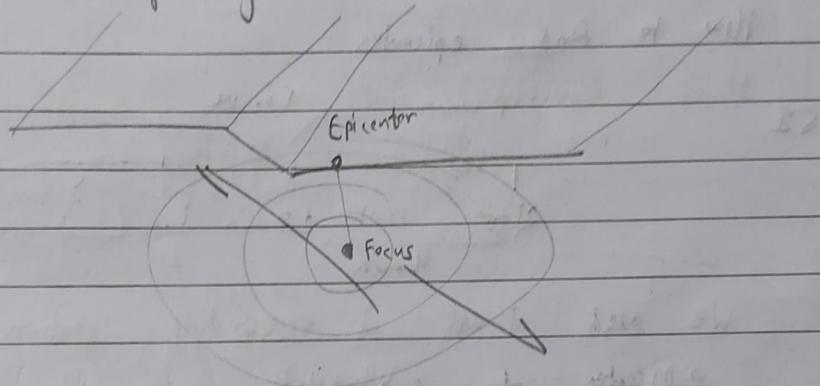
- hot springs are formed nearby volcanic eruptions

# Earthquake

Shaking or vibration of the ground

Earthquake creates landslide

downflow movement of soil & rocks due to gravity



Earthquake

For happen due to

- shaking of plate boundary (activity in tectonic plate)
- slip along the plate boundary

inside eurasian plate

Tethys ocean subducted because of which Indian plate was pulled to Eurasian plate causing the origin of Himalaya

left to right

Types of Seismic Wave

Body wave

travel through liquid & solid

(can propagate through body of earth)

- P wave - Primary wave → fastest, least destructive

up & down

surface wave

Can travel through solid

slowest most destructive

(cannot go through

goes along the surface of earth

earth only propagate on surface)

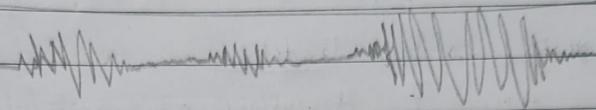
(between air & ground)

Surface wave - love wave  $\rightarrow$  sliding of particle taking place

- Rayleigh wave - rolling of particle

Time  $\rightarrow$

Amplitude

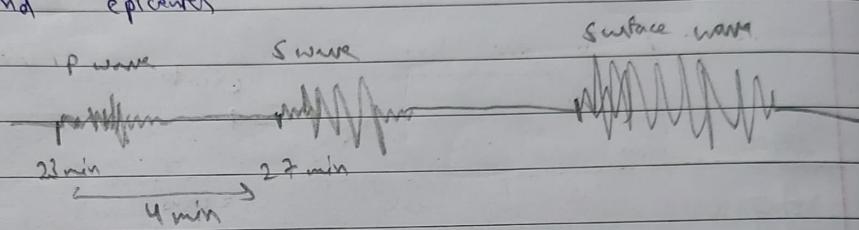


P wave S wave

Surface wave

How to find epicenter

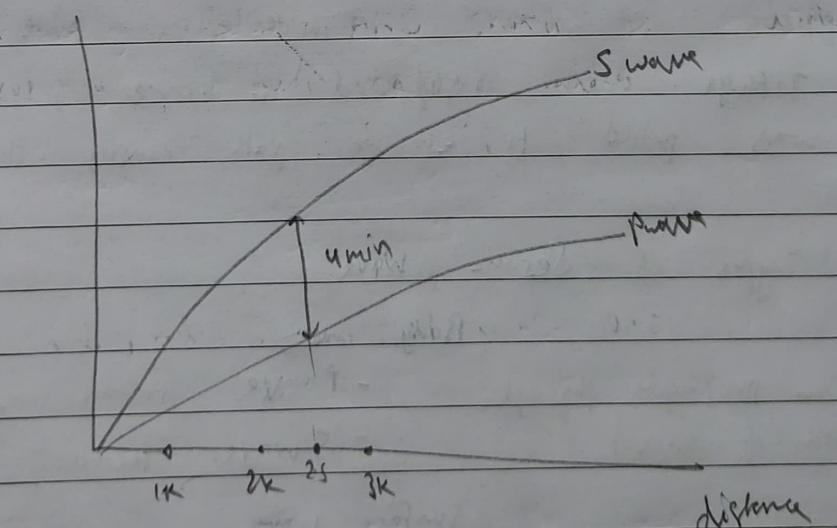
$S_1$



We need at least 3 recording station to determine the epicenter of earthquake

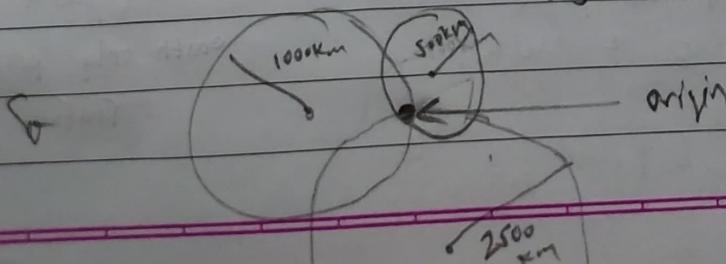
As distance off from epicentre increase the time b/w p & s wave increase

Time



distance 1000 Km

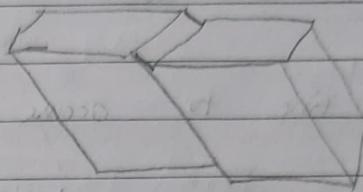
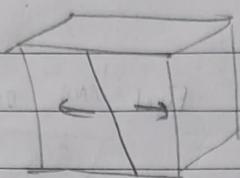
now as distance of  $S_1$  from epicenter is  
2500 Km.



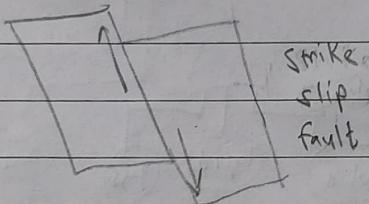
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## Faults & Earthquakes



Grobbien is the earth b/w two normal fault.



Tsunami - harbor wave in Japanese

Wind causes oceanic waves

Highly energetic ocean waves sweep the land causing destruction on buildings, cars etc.

e.g. 2004 Indian ocean Tsunami

2011 Fukushima nuclear meltdown due to Tsunami.

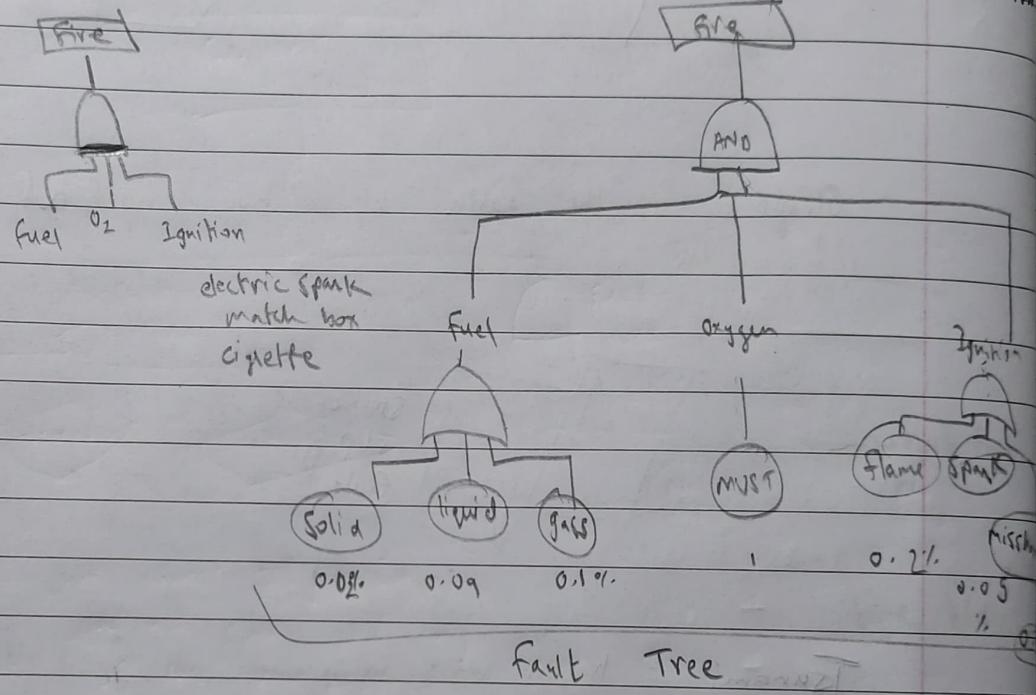
Earthquake causes fire at electricity wire, gas line leakage  
breakage &

- As Peru & Chile face earthquake regularly they have made high ~~regulation~~ construction because of which there is less destruction

# Analytical Systems for Risk Assessment

## Fault Tree Symbol

Q For fire to occur we require Fuel AND oxygen AND ignition



So Probability below AND should be multiplied &  
Probability below OR is added

$$(0.1 + 0.09 + 0.02) \mid (0.2 + 0.05 + 0.1)$$

$$(0.21) \mid (0.35) = 0.0735$$

$$\therefore 7.35\%$$

More the OR more the risk factor  
more the AND less the risk factor

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## Measuring Magnitude of Earthquake

5 Richter scale is logarithmic.

if  $E_1$  is of 3.0 &  $E_2$  is of 5.0 so

$$3 = \text{log } x_1$$

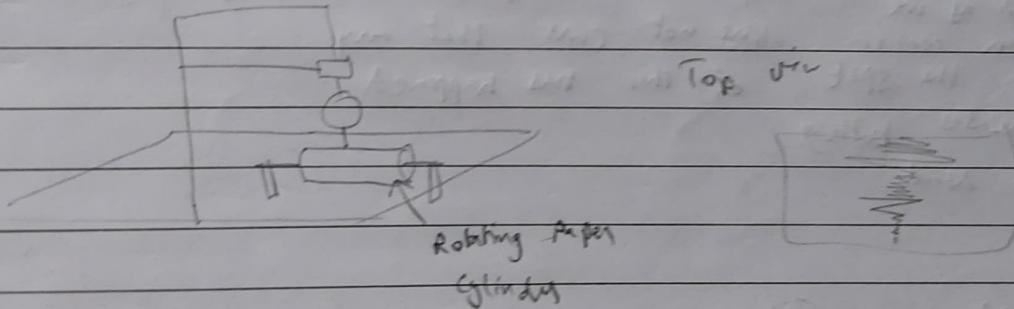
$$5 = \text{log } x_2$$

$$10^3 = x_1$$

$$10^5 = x_2$$

So  ~~$E_2$~~   $E_2$  is 100 times more powerful than  $E_1$ .

Seismograph



During an earthquake, the ball pen remains stationary but the earth is shaking. The pen marks lines on the rotating paper for we can measure the earthquake.



if we don't know  
it is true or  
not

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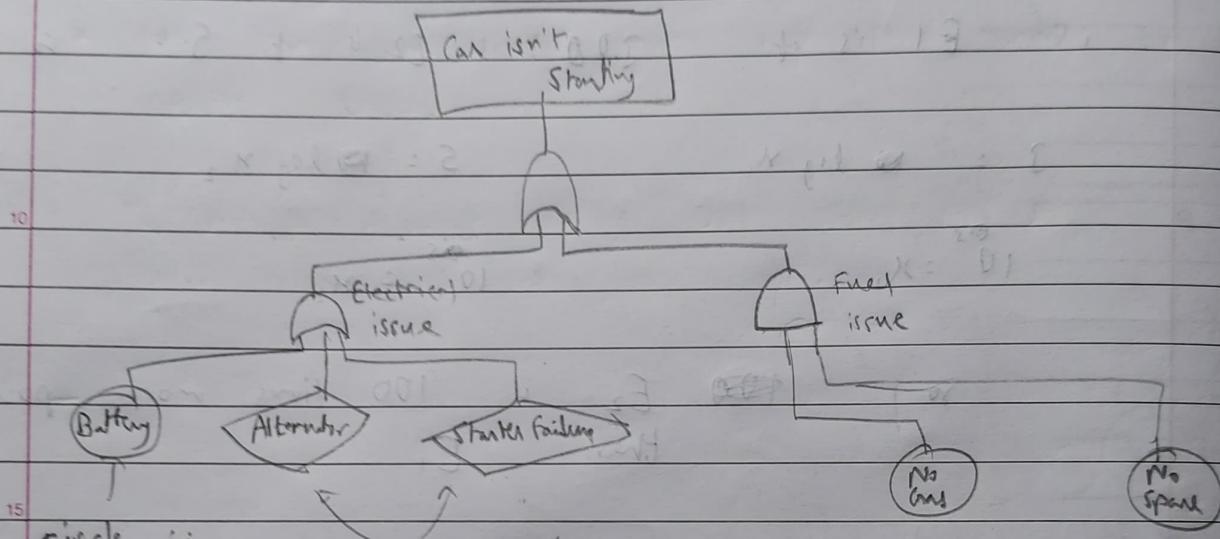
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Car isn't starting on winter day.

There can be electrical issues and/or fuel issues

Battery, alternator, starter failure

No Petrol no spare petrol



Circle is used as we cannot tell or we can confirm. I am not sure that any on the spot of this has happened whether battery is dead

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Machine Failure

Mechanical  
Failure

Failure of electrical  
failure

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Electrical  
failure

mechanical  
failure

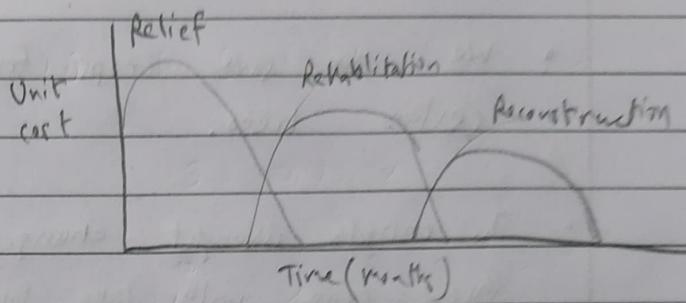
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Response Recovery

## Disaster Management Cycle

Sudden random disruption of working of society

Disaster Recovery  
Cycle



### 4 guiding principles

- Humanity to be Maintained
- Neutrality to be Maintained
- Impartiality
- Operational Independence

### Rehabilitation

Uttarakhand flood - Why? Cloud Burst

- After encroachment over rivers/moving on slope of mountain building were made but naturally when it rains water slide through mountain but as no there were obstruction in pathways of water way this lead to a lot of destruction also causing landslides.

Droughts & more other disasters are ~~happening~~ natural as well as human activity.

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## \* Disaster Risk ~~Management~~ Reduction

5. After disaster we have to analyse it why it happened
  - We can save crops from high speed wind by planting certain trees.
  - 10. To mitigate drought change crop sowing pattern.  
Grow crop with take less water.

Chennai - Rapid urbanisation & illegal construction, human encroachments  
Flood

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