FACTS ABOUT EARTHQUAKES

- Earthquakes strike suddenly, violently, and without warning at any time of the year and at any time of the day or night.
- Earthquakes **cannot be predicted**, but they have some patterns. Sometimes foreshocks precede quakes, though they look just like ordinary quakes. But every large event has a cluster of smaller aftershocks, which follow well-known statistics and can be forecasted.
- About **60%** of India's land area in prone to earthquake. Regions along the Himalaya are the severe most **(Zone V)**. After 1993 Latur earthquake entire geographic area in India has been brought under seismic zone – II, III, IV and V.
- As per **Indian Mythology**, the Earth is held in place by eight gigantic elephants, all balanced on the back of a turtle, which itself stands on the coils of **a snake**. If any of these animals shift or move, an earthquake occurs.
- India experienced four M8+ earthquakes between **1897 to 1950** along the Himalaya, which is the rarest in the world for any country. Fortunately Indian megacities have not yet experienced any such.
- An earthquake happens somewhere in the world once every thirty seconds. You may not notice a M2 quake. You would feel the ground shake in a M3 quake. A M6 or higher can **destroy a city in developing countries**. The M7.0 Haiti earthquake (2010) killed 220,000 people, destroyed 4,000 schools, generated 19 million cubic m debris and made 1.5 million people homeless.
- A **M7 or higher** earthquake can oscillate the whole earth for minutes. It affects Earth's rotation and so standard time clock is being adjusted.
- In 1975, people reported in northeastern China mice and rabbits leaving their burrows and snakes coming out of hibernation in the middle of the winter before a huge earthquake occurred. But in **1976 one M7.8 earthquake** in China killed more than 200,000, without any warning sign.
- Aftershocks can follow an earthquake on and off for days or weeks. Most Earthquakes last a minute or less. The **2004 Indian Ocean** earthquake lasted nearly 10 minutes; possibly the longest on record so far
- A magnitude 7.2 earthquake produces 10 times more ground motion than a magnitude 6.2 earthquake, but it releases about 31 times more energy. India Ocean Tsunami (2004) released **31680 times** more energy than the nuclear bomb that was dropped on Hiroshima City Japan in August, 1945.
- The average recurrences of an earthquake of M3.7–4.6 is every year, of M4.7–5.5 every 10 years, and of M5.6 or larger every 100 years.
- Earthquakes occurring at a depth of less than 70 km are classified as 'shallow-focus' earthquakes, while those with a focal-depth between 70 and 300 km are commonly termed 'mid-focus' or 'intermediate-depth' earthquakes.
- Approximately one earthquake with a magnitude of **8.0 or higher** occurs per year, of M7-M8 about 20, of M6-M7 about 120, of M5-M6 about 1200. About 90% of all earthquakes occur along plate boundaries.
- **Japan** is one of the most earthquake-prone nations in the world because it's geographical area lies mostly at inter-plate boundaries.
- American scientist **Charles Richter** invented the Richter Scale in 1935 to measure the energy released and Mercalli/MSK scales measures the felt or observed intensity at a particular location. Great Shillong (1897) and Bihar-Nepal (1934) earthquakes in India helped Richter a lot to confirm his findings.
- Most earthquakes happen along the edges of Earth's big plates. About 80% of the world's earthquakes take place along the northern rim of the Pacific Ocean, a zone called the Pacific Ring of Fire.
- The world's **greatest land mountain range** is the Himalaya-Karakoram. It contains 96 of the world's 109 peaks of over 7,317m. The longest range is the Andes of South America which is 7,564km in length. Both were created by the movement of tectonic plates.
- Earthquakes are caused by movement of the Earth's tectonic plates, human activity can also produce earthquakes. People came to know about **Plate tectonics in 1960's**. Four types of faults are: normal, reverse, thrust, and strike-up.
- Englishman **John Milne** invented the seismograph in 1880. There are more than 10000 seismic stations installed now across the globe.
- Some animals (dogs, snakes, fishes) may **sense tremors** and electrical signals before a quake but there are no scientific tools to understand the mind of them yet.
- Earthquakes are mostly caused by **geological faults**, but they can also be caused by landslides, nuclear testing, mine tests, and volcanic activities.
- The **earliest recorded evidence of an earthquake** has been traced back to 1831 BC in the Shandong province of China.
- In 350 BC the Greek scientist Aristotle stated that **soft ground shakes more than hard rock** in an earthquake.
- Earthquakes kill approximately 8,000 people each year and have caused an estimated 13 million deaths in the past 4,000 years.
- The **world's deadliest recorded earthquake** occurred in 1556 in central China, killing an estimated 830,000 people.
- **Moonquakes** do occur, but they happen less frequently than earthquakes on the Earth
- The largest recorded earthquake in the world was of magnitude **9.5 (Mw) in Chile** on May 22, 1960. It created great Tsunami and shook the entire earth for many days.
- More earthquakes happen in the **Northern Hemisphere** than in the Southern Hemisphere.
- **No building is100% safe against earthquake but it can be made 100% safe for people**

The motivation for school seismic safety is much broader than the universal human instinct to protect and love children

EARTHQUAKE AWARENESS

LUDO

nidm
Towards a disaster free India

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EARTHQUAKES: (DO'S & DON'TS)

Before

- Make your house earthquake resistant by taking expert help. Secure heavy furniture and other objects from falling during shaking.
- Pick couple of "safe" meeting places that are easy to reach. They could be under a sturdy table or desk or against an interior wall. Practise DROP, COVER, AND HOLD-ON in each safe place at least once in a month.
- Take your earthquake survival kit (fire extinguisher, a flash light, radio, water etc.) with you. It should contain all necessary items for your protection and comfort to be sufficient atleast for three days.
- Till date prediction of earthquake is not possible. Don't listen to or spread rumours.

During

- STAY CALM! If you are in bed, hold on and stay there, protecting your head with a pillow.
- If you are outdoors, find a clear spot away from buildings, trees, streetlights, and power lines. Drop to the ground and stay there until the shaking stops.
- If you are in a vehicle, pull over to a clear location, stop and stay there your seatbelt fastened until the shaking has stopped. Avoid bridges, flyovers or ramps that might have been damaged by the quake.
- In a high-rise building, expect the fire alarms and sprinklers to go off. Check for and extinguish small fires, and if exiting, don't use elevators; instead take the staircase and don't rush to the exit point. Get out calmly in an orderly manner to reach open space.
- If in coastal area, move to higher ground and listen to Tsunami warning.
- If you are on a steep hillside in mountainous areas be alert and move away in case of landslides, falling rocks and other debris.

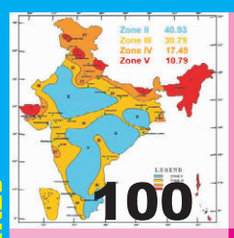
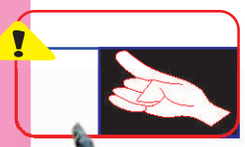
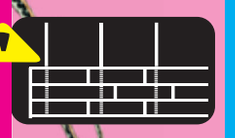
After

- Check yourself and others for injuries and don't use your telephone to call relatives and friends, call only for medical help, move cautiously and check for unstable objects around.
- Listen to Radio, TV for emergency information and safety guidance. Don't use the phone unless it's an emergency.
- Watch out for fallen power lines or broken gas lines, and stay out of damaged areas.
- Anticipate aftershocks, if shaking lasted longer.
- Stay out of damaged buildings. Strong aftershocks can cause further damage to the buildings and weak structures may collapse.

SNAKE AND LADDER GAME FOR EARTHQUAKES AWARENESS (Ver.-1)

HAVE BETTER UNDERSTANDING OF YOUR ROLES AND RESPONSIBILITIES BEFORE, DURING AND AFTER EARTHQUAKES

ORIGINAL DESIGN – ASHISH RANA, STUDENT & DR HEMANT VINAYAK, ASST. PROF., NIT-HAMIRPUR, MODERATION: PROF. C. GHOSH, NIDM

 100	Take expert advise before making your house and follow Indian seismic codes and guidelines 99	Develop strategy of retrofitting or rehabilitating existing structures and infrastructure that were built under earlier using less advanced codes or standards. 98	Keep Family Disaster Plan ready and practice it regularly 97	It may not be possible to make earthquake proof buildings; however, it is possible to make buildings earthquake resistant 96	Do not re-enter badly damaged buildings and do not go near damaged structures 95	Secure items that might fall (televisions, books, computers, etc.). Install strong latches or bolts on cabinets. 94	Evaluate the earthquake safety of your building and retrofit/strengthen if advised by experts 93	 92	 91
Take pictures of the damage, both of the house and its contents, for insurance claims or for documentation purpose. 81	82	Retrofit old structures and implement building codes for new structures 83	Create a culture of safety such as how to screen buildings to identify those potentially in need of seismic rehabilitation; how to secure the nonstructural components of buildings to reduce earthquake damage, casualties, and losses. 84	 Drop 85	 Cover 86	 Hold 87	Make sure to have a functional network among the Hospitals, fire station, ambulance services, police, community organisations in coherence with city municipality and schools 88	89	If got caught by fire due to earthquake then perform STOP, DROP and ROLL until fire on clothes extinguishes 90
Do not be Panic: Stay calm and take necessary action 80	 79	Education is a human right, universal and unavoidable. This right must not disappear or get suspended because of earthquake induced disasters!! 78	77	Keep away from old buildings, electricity wires, slopes and walls, which are liable to collapse during Earthquake 76	75	In order to have disaster insurance and other benefits, it is important to have completion certificate from municipal authorities; which will be based on resilience measures taken up by you 74	 73	Proper Structural design and engineering practices should be followed while constructing a house 72	 71
Developing, adopting, and enforcing up-to-date building codes, including their seismic provisions and the standards referenced by those provisions, are among the most effective strategies available for earthquake risk reduction. 61	62	….schools built world-wide routinely collapse in earthquakes due to avoidable errors in design and construction, causing predictable, unacceptable and tragic loss of life…we must stop it by all means…. 63	64	65	66	67	 68	Move away from power lines, walls, false ceiling, parapet, falling flower pot sand other element that may fall or collapse 69	Earthquake insurance, conducting earthquake drills, strengthening buildings must be done by households, companies, neighborhoods, cities and regions on regular basis. 70
Protect yourself by staying in the corner of a room, under at able or a bed. 60	Do Not rush to the exit point. Get out calmly in an orderly manner 59	 58	Capacity is the resources of communities to cope with a threat or resist the impact of a hazard. Risk is the probability/likelihood of a disaster happening. 57	56	 55	54	Everyone should know what to do in case all family members are not together. 53	A **hazard** is a physical event that can potentially trigger a disaster. **Vulnerability** is the degree to which communities are susceptible to loss, damage, suffering and death, in the event of a disaster. 52	51
Do not use elevators  41	When driving a vehicle pull to the side of the road and stop 42	 43	44	Know well seismic zonation of your area, get your house evaluated for retrofitting (if required) and ensure expert Civil Engineer's help in making your house earthquake resistant as per IS code (IS:1893-2002) (details at www.bis.org.in & www.bmtpc.org.in) 45	Teach all members of your family how to turn off the electricity, water and gas supply.... 46	Move away from windows, glass and unfastened objects 47	Do not try to cross bridges/ flyovers, which may be damaged 48	 49	50
40	Keep corridors of your school free from furniture or other store items 39	38	If you are in a structurally sound building, stay there 37	 36	Help neighbors who may require special assistance after the **shaking stops** 35	Place heavy or bulky "objcets" on the floor or on the lowest shelves 34	33	Disasters are seen as the consequence of inappropriately managed risk. Therefore, it is important to look after disaster safe school facilities 32	Preparedness saves misery; Mitigation saves lives; consult expert Civil engineers and follow norms as per building codes [www.bis.org.in] 31
School bags can be used to protect head in place of desks 21	22	 23	24	25	26	Losses due to natural disasters are 20 times greater (as a percentage of GDP) in developing countries than in industrialized countries 27	If you are living in earthquake prone area, get your building designs checked with earthquake resistant measures and ensure quality constructions as per guidelines available in [www.nidm.gov.in, www.ndma.gov.in, www.bis.org.in] 28	Always remember!! "Earthquakes don't kill people, unsafe buildings do." 29	During the 2001 Bhuj earthquake in India(M6.9, with a maximum MSK of IX), 971 students and 31 teachers died, and 1051 students and 95 teachers were injured 30
Instead take the"staircase" to reach open space 20	 19	If you are on a steep hillside, move away in case of landslide and falling rocks 18	 17	If you are inside an old weak structure take the fastest and safest way out 16	 15	Extra cost of earthquake resistant features for reinforced concrete building (4-6 storeys) would be 6-10% 14	Schools frequently collapse during earthquakes and will continue to do so unless individuals, communities, scientists, government sand other bodies discuss and devise solutions to address the problem. 13	Our Families should be made aware of Earthquake and its impacts 12	About 300 school children marching in the 26th January Republic Day, 2001 procession in a narrow lane in the town of Anjar were killed when buildings on both sides collapsed on them….. 11
 1	 2	In India about 11% geographical area are in Seismic Zone-V (mostly along the Himalaya), 18% in Zone–IV, 31% in Zone-III and rest in Zone-II 3	Are you living in an earthquake prone area with seismic Zone –III, IV & V? Get your home checked by experts for earthquake protection 4	Are you living in a hill area that prone to earthquake, rock falls and landslides? Get your locality checked by experts. 5	Are you living within 300m from coast line? Get your locality checked by expert sand take measures against Tsunami/Tidal waves. 6	Is your building having soft storey/stilt parking without earthquake protection? Get your building checked by experts and adopt retrofitting measures. 7	Extra cost of earthquake resistant features in severe earthquake zone for masonary buildings shall be 4-6% 8	In India less than 3% of the 230 million building units are made of concrete walls, 85% of the buildings are non-engineered. About 29% are made of mud walls and 45% are made of burned bricks walls, which are not at all earthquake resistant. 9	 10

TOLL-FREE EMERGENCY HELPLINE | FIRE-101 | AMBULANCE-102/108 | POLICE-100 | DISASTER CONTROL ROOM-1077