

IQRA NATIONAL UNIVERSITY
PESHAWAR

B.Tech → CIVIL

BATCH → 2015

NAME → DANISH KHATTAK

PAPER → EARTHQUACK

ID → 12430

DATE → 23/6/2020

MID TERM

QUESTION 1

PART (a)

- There are two types of body waves -
A - Compressional or primary waves
B - Shear or secondary waves

Primary waves

- A type of body wave in which rock particles vibrate parallel to the direction of wave travel -

- These are faster travelling waves and can travel through solids, liquids and gases -

Secondary waves

- A type of body wave which is transverse where the earth moves up and down as the wave travels -
- They only move through solids -

Part (b)

1. • Was one of the first seismic scales to represent earthquake intensities -
 - It was developed by Michele Stefano Conte of Italy and Francois-Alphonse Forel of Switzerland -
 - In 1873 version of Rossi-Forel had 10 intensity levels -
 - Some are microseismic tremor, feeble tremor, Moderate tremor and Strong tremor etc -

Part (b)

2. • Mercalli scale is a scale to measure intensity of earth-quakes -
 - It does not take into account energy of an earthquake directly
 - It has different intensities like Instrumental, Moderate etc -

Richter scale is a scale of number to
power or magnitude of earthquakes -
Charles Richter developed the Richter scale -
His scale worked like a seismogram,
measured by a particular type of
seismometer at distance of 100 km
from the earthquakes -
• The Richter scale is measured on scale
from 1 to 10

SESSION: 2

(a)

Centre of mass is the point where the entire mass of the floor acts

It is the average position of all the parts of system, weighted according to their masses-

- For example: simple rigid objects with uniform density, the centre of mass is located at the centroid-

Centre of Rigidity:-

- Centre of rigidity is the stiffness centroid within a floor diaphragm plan-
- When centre of rigidity is selected or subjected to lateral loading, floor diaphragm will experience only translational displacement
- Other levels are free to translate and rotate since behaviour is coupled both in plan and along height-

Part (b)

Base Isolation:-

- This is a state of the art method in which the structure is separated from the base by introducing a suspension system between base and the main structure-
- This is used to prevent or minimise damage to buildings during an earthquake-
- Base isolation units consist of linear motion bearings that allow the building to move, oil dampers that absorb the forces generated by the movement of building-

Isolation is very effective way controlling seismic response of civil engineering structures. The earthquake energy is prevented from entering the structure by decoupling the latter from the ground motion thereby reducing both the ductility demand and Inter Storey drifts-

- Base Isolator bearings were pioneered in New Zealand by Dr Bill Robinson during the 1970s-
- Base Isolation is one of the most widely accepted seismic protection systems in earthquake prone areas-
- The fundamental principle of base isolation is to modify the response of the building so that the ground can move below the building-
- The building that is perfectly rigid will have zero period-
- The structure and the ground move the same amount-

QUESTION :- 3

Re-entrant corners :-

- These are defined as any inside corners that forms an angle of 180° or less.
- In a solid that is subjected to internal or external loads, re-entrant corners create high stress concentrations.
- Buildings that have suffered seismic damage due to re-entrant corners occasionally feature in earthquake reconnaissance reports.

- Although re-entrant geometries can take many shapes.

Effect caused by Re-entrant corners

- There are two effects caused by re-entrant corners -
- They tend to produce differential motions between different wings of the buildings that because of stiff elements that tend to be located in this region.
- This form is torsion - which is caused because the center of mass and ~~is~~ center of rigidity in this form cannot geometrically coincide for all possible earthquake directions - The result is rotation - The resulting forces are very difficult to analyze and predict.

Remedies for Re-entrant corners

- There are two basic alternative approaches to the problem of re-entrant corner forms -
- Structurally to separate the building into simpler shapes or to tie the building

ues more strongly with elements
tioned to provide a more balanced
stance - The latter solution applies
ly to smaller buildings -