

KATHMANDU UNIVERSITY
End Semester Examination
August, 2018

Marks Scored:

Level : B.E.
Year : III

Course : CIEG 318
Semester: II

Exam Roll No.:

Time: 30 mins.

F. M. : 10

Registration No.:

Date AUG 24 2018

SECTION "A"

[20Q. \times 0.5=10 marks]

Encircle the most appropriate answer among the given choices.

- Which of the following describes the build-up and release of stress during an earthquake?
 - the Modified Mercalli Scale
 - the elastic rebound theory
 - the principle of superposition
 - the travel time difference
- The amount of ground displacement in an earthquake is called the _____.
 - epicentre
 - slip
 - dip
 - focus
- The point where movement occurs that triggers the earthquake is the _____.
 - Dip
 - Focus
 - epicentre
 - strike
- Which of the following sequences correctly lists the different arrivals from first to last?
 - P waves ... S waves ... Surface waves
 - Surface waves ... P waves ... S waves
 - P waves ... Surface waves ... S waves
 - S waves ... P waves ... Surface waves
- With increasing travel time the difference in arrival times between the P and the S waves _____.
 - increases
 - stays constant
 - decreases
 - independent of travel time
- Earthquake A has a Richter magnitude of 8 as compared with earthquake B's 6.
 - A is 100 X more intense than B
 - A is 1000 X more intense than B
 - Richter magnitude does not measure intensity
 - B is 0.01 X as intense than A
- Which of the following statements best describes the state of earthquake prediction?
 - scientists can accurately predict the time and location of almost all earthquakes
 - scientists can accurately predict the time and location of about 50% of all earthquakes
 - scientists can accurately predict when an earthquake will occur, but not where
 - scientists can characterize the seismic risk of an area, but cannot yet accurately predict most earthquakes
- Which of the following causes the highest earthquake amplification?
 - hard rock
 - stiff soil
 - dense soil and soft rock
 - soft soil

9. Which of the following factors affect liquefaction?
- Moderately saturated soils
 - Poor subsurface drainage
 - Fragmented soil structure
- a. i only b. i and ii c. i and iii d. i, ii and iii
10. Which of the following is NOT a feature of rigid diaphragm?
- The load should be distributed based on the stiffness
 - Mid span deflection is greater than twice the average displacement at ends.
 - Mid span deflection is less than twice the average displacement at ends.
 - Able of transfer the torsion and shear deflection
11. IS 1893-2002 gives details on:
- Seismic strengthening
 - Improving earthquake resistance
 - Earthquake resistance structures
 - Earthquake resistance design
12. Energy absorbed by silicone based fluid passing between piston - cylinder arrangements are called _____ dampers.
- viscous
 - lead rubber
 - yielding
 - roller
13. Beams and columns in the open ground storey are required to be designed for _____ times the forces obtained from this bare frame analysis.
- 2.5
 - 1.5
 - 2
 - 1
14. The length of anchorage for a bar of grade Fe415 is about _____ times its diameter.
- 50
 - 30
 - 40
 - 20
15. The ties present in beam column joint causes
- reduction in shear force
 - resistance in bending moment of the BEAM component
 - nullification of the effect of tension in concrete
 - in cancellation of axial force induced
16. The Indian Standard IS 13920 - 1993 prescribes that closely spaced ties must be provided at the two ends of column over a length not less than larger dimension of the column, _____ of the column height or _____ mm
- 1/5th, 400
 - 1/6th, 450
 - 1/6th, 400
 - 1/5th 450
17. When laps are provided, ties must be provided along the length of the lap at a spacing not more than
- 100 mm
 - 200 mm
 - 150 mm
 - 250 mm
18. How does shaking ground cause soft sediment to liquefy?
- It breaks the sediment particles into smaller pieces
 - It evaporates water in the pores of the sediment
 - It makes sediment particles fit more tightly together
 - It melts the sediment
19. For an ideal 5 storey Rigid building, Time Period is
- greater than zero
 - equal to zero
 - less than zero
 - less than 1
20. As per IS 1893:2002 "A soft storey is one in which the lateral stiffness is less than _____ of that in the storey above or less than 80 percent of the average lateral stiffness of the three storeys above".
- 70 percent
 - 75 percent
 - 90 percent
 - 80 percent

SECTION "B"

Attempt ALL questions. Assume data if necessary.

1. (a) Define Fault and give its classification with neat sketch. [3]
 (b) List and describe in brief the major ground motion parameters. Also describe in brief any two types of seismic waves. [3+2]
2. The plan of one story building is shown in Figure 1. The building could be considered as composed of 2-D frame along the orthogonal directions. The roof diaphragm is rigid in its own plane, and mass of the roof is uniformly distributed. Calculate the lateral forces in 2D frames when the building is subjected to an earthquake load of 300 KN in Y-direction. [8]

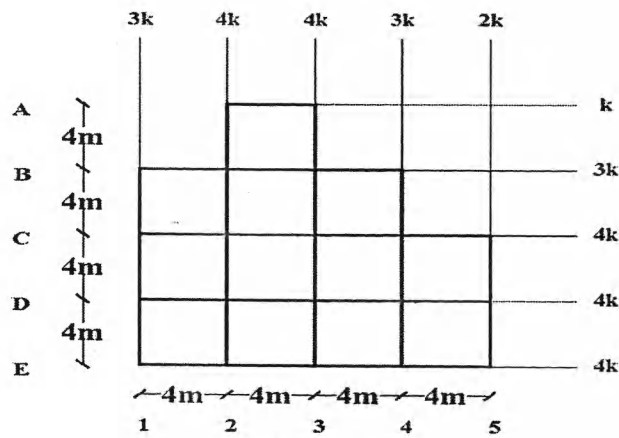


Figure 1

3. Carry out exact lateral load distribution for a two storey rigid floor MRF building (Figure 2). Design earthquake load in Y direction of the building is 600 KN on roof and 300 KN at 1st floor. [8]

$$[K]_A = [K]_E = \begin{bmatrix} 180 & -55 \\ -55 & 60 \end{bmatrix} \times 10^6 \text{ N/m}$$

$$[K]_B = [K]_C = [K]_D = \begin{bmatrix} 180 & -55 \\ -55 & 60 \end{bmatrix} \times 10^6 \text{ N/m}$$

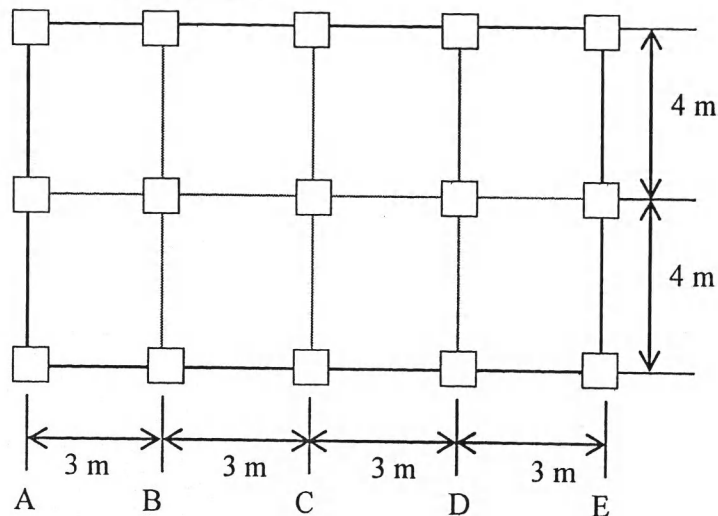


Figure 2

4. Analyze the plane frame shown in figure 3 using portal frame method and draw BMD. Each bay of the frame is 4 meters. [8]

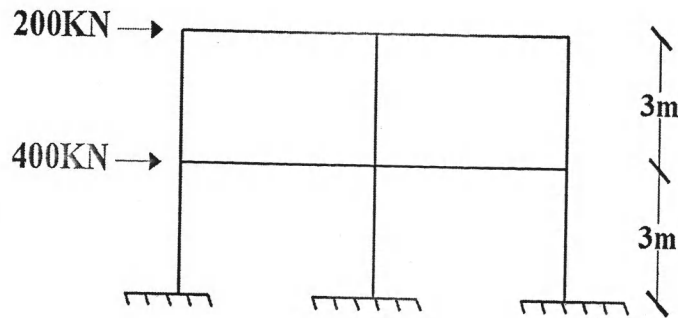


Figure 3

5. A 3 m high, 8 m wide single bay single storey frame is rigidly joint with a beam of mass 5,000 kg and columns of negligible mass and stiffness of $EI_c = 4.5 \times 10^3 \text{ kNm}^2$. Calculate the natural frequency in lateral vibration and its period. Find the force required to deflect the frame 2.5 mm laterally. [4]
6. What are the various building configuration implications for earthquake resistant design? Explain. [4]