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11-5-19
[F.T]
B.E / B.Tech END SEMSTER EXAMINATION, April/May 2019

CIVIL ENGINEERING

Seventh Semester

CE8704 – STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

(Regulation: 2012)

Time: 3 Hours

Max Marks: 100

Answer ALL Questions

(Use of IS 1893, IS 4326, IS 13920 is permitted)

PART A-(10x2=20 Marks)

- 1.) Define the term damping?
- 2.) A harmonic motion has a maximum velocity of 6m/s and it has a frequency of 12 cps. Determine its amplitude.
- 3.) Define mode shape.
- 4.) Define modal superposition and state its importance.
- 5.) State elastic rebound theory.
- 6.) Differentiate between magnitude and intensity of an earthquake?
- 7.) Draw the cyclic behavior of concrete.
- 8.) What is Bauchinger's effect?
- 9.) Draw a neat sketch of reinforcement lapping in a beam as per IS 13920.
- 10.) Why shear walls are constructed in high rise buildings?



Part B- (5x16=80 Marks)

[Q. No: 11 is compulsory]

11.) Draw a neat sketch of beam and column ductile detailing and explain briefly its requirements.

12 (a) Derive an expression for an undamped free vibration of SDOF system

(Or)

(b) A damped free vibration is conducted to determine the dynamic properties of a one storey building. The mass of the building is 10000 kg. Initial displacement of the building is 0.702 cm. Maximum displacement on the first cycle is 0.53 cm and the period of this displacement cycle is 1.7 s. Determine the effective weight, undamped frequency, logarithmic decrement, damping ratio, damping coefficient, damped frequency and the amplitude after 6 cycles.

13 (a) Determine the natural frequencies and mode of vibration of the given system as shown in Figure 13 (a)

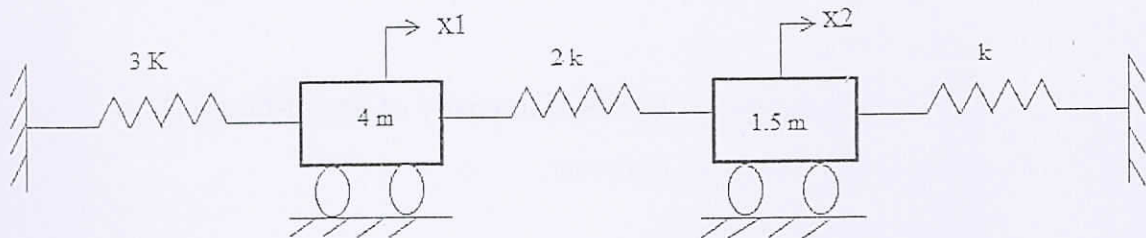


Figure 13(a)

(Or)

(b) Determine the natural frequencies and the mode shapes for the shear building as shown in Figure 13(b). $EI = 4.5 \times 10^6 \text{ N-m}^2$ for all the columns



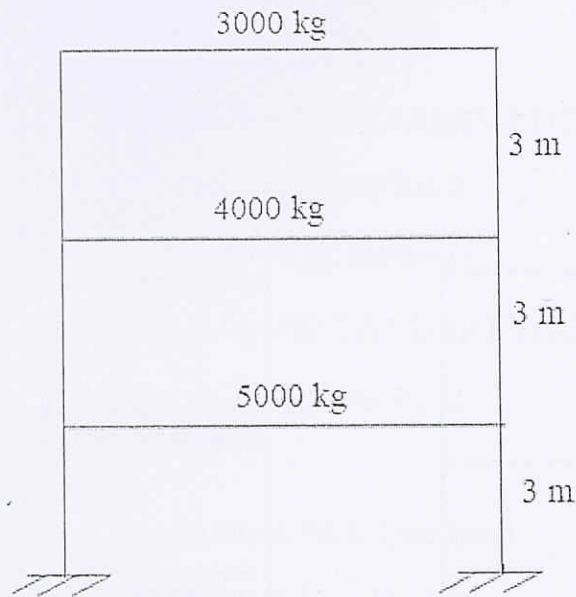


Figure 13 (b)

14 (a) Define fault. With neat sketches explain in detail about the different types of plate boundaries and their interactions.

(Or)

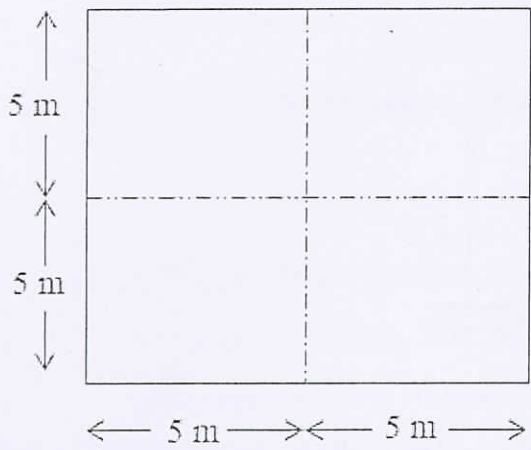
(b) What are seismic waves? Explain in detail the types of seismic waves with the help of neat sketches.

15(a) Define the term earthquake. Enumerate in detail about the various effects of earthquake in Reinforced concrete and steel structures.

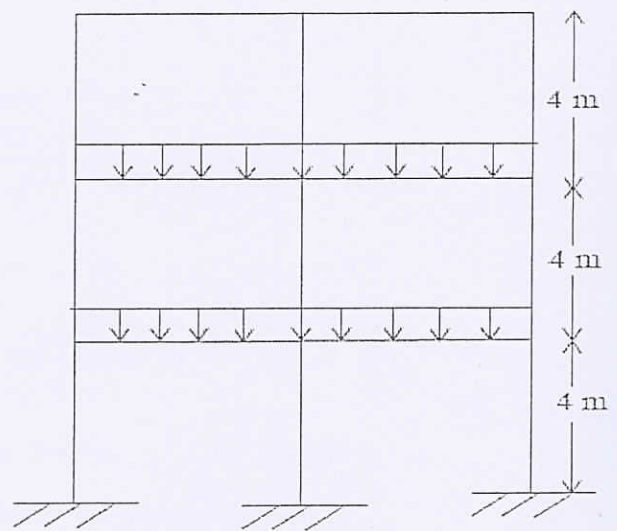
(Or)

(b) The plan and elevation of a three storey RCC school building is shown in Figure 15 (b). The building is located in Chennai. The type of soil encountered is medium stiff and it is proposed to design the building with special moment resisting frame. The intensity of dead load is 10 kN/m^2 and the floors are to cater a live load of 3 kN/m^2 . Determine the design seismic loads on the structure by equivalent static analysis.





a.) Plan



b.) Elevation

Figure 15 (b)