KUMARAGURU
college of technology
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B.E. DEGREE EXAMINATIONS: APRIL / MAY 2023

(Regulation 2018)

Seventh Semester

CIVIL ENGINEERING

U18CEE0012: Earthquake Engineering

(Use of IS:1893, 4326, 13827, 13828 are permitted)

COURSE OUTCOMES

CO1: Understand the behavior of earthquake and theory of vibration.
CO2: Understand the concepts of SDOF systems.
CO3: Understand the concepts of MDOF systems
CO4: Study various IS code provisions for earthquake resistance and vibration control methods.
CO5: Design RC structural elements resisting earthquake forces as per IS code provisions

Time: Three Hours   **Maximum Marks: 100**

Answer all the Questions:-
PART A (10 x 2 = 20 Marks)
(Answer not more than 40 words)

1. What is meant by epicenter?	CO1	[K$_1$]
2. Differentiate between intensity and magnitude of earthquake.	CO1	[K$_2$]
3. Draw a typical harmonic excitation function and list the salient parameters.	CO2	[K$_2$]
4. What is the application of Duhamel's integral in vibration of SDOF system?	CO2	[K$_2$]
5. How will you decouple equation of motion?	CO3	[K$_2$]
6. What is meant by critical damping?	CO3	[K$_1$]
7. What is 'Design Horizontal Acceleration Coefficient' (A$_h$)? Write an equation for A$_h$.	CO4	[K$_1$]
8. Differentiate between active and passive control devices.	CO4	[K$_2$]
9. Brief about the structural action of shear wall and space frame.	CO5	[K$_2$]
10. How will you define ductility?	CO5	[K$_1$]

Answer any FIVE Questions:-
PART B (5 x 16 = 80 Marks)
(Answer not more than 400 words)

11. Write the equation of motion for a damped free vibration of a system and discuss in detail about damping.	16	CO1	[K$_2$]
12. Derive the response of a undamped SDOF system subjected to a harmonic loading.	16	CO2	[K$_2$]

13. A simply supported massless beam is shown in figure.13. The beam carries two masses   16   CO3 [K₃]
of equal magnitude at every third point of the beam span. Model the system and
formulate the equation of motion governing the undamped free vibration in the vertical
direction.

Figure .13

14. Explain the features that can be introduced into a masonry building that can improve its   16   CO4 [K₂]
seismic performance.

15. A RCC beam of rectangular section has to carry a distributed load of 20 kN/m in   16   CO5 [K₃]
addition to its own weight and a dead load of 25 kN/m. The maximum bending moment
and shear force due to earthquake are 60 kNm and 40 kN respectively. Center-to-center
distance between supports is 6 m. Design the beam using M20 grade concrete and
Fe415 steel.

16. Write the steps involved in the design of shear wall of a building which is located along   16   CO5 [K₂]
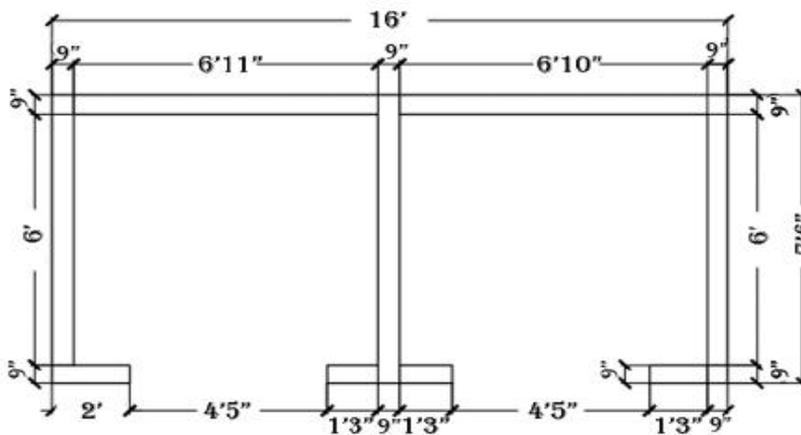the three sides of lifts as shown in figure.16.

Figure. 16

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