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Question Paper Code: 57103

B.E. / B.Tech. DEGREE EXAMINATION, APRIL 2019

Seventh Semester

Civil Engineering

15UCE703-STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

(IS 13920:1993, IS 4326:1993 and IS 1893(Part 1):2002 are permitted)

(Regulation 2015)

Duration: Three hours

Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Choose the example of periodical loading CO1- R
(a) Earthquake load (b) bomb blast (c) wind force (d) rotating machinery
2. For underdamped system, the value of ρ is CO1- R
(a) Greater than 1 (b) Equal to zero (c) Less than one (d) Equal to one
3. Characteristic vector is also known as CO2- R
(a) Modal vectors (b) Eigen values (c) Modal values (d) Shape vector
4. The lowest frequency of the vibration is called CO2- R
_____frequency
(a) fundamental (b) periodical (c) first mode (d) second mode
5. The point of origin of an earthquake below the surface of the CO3- R
earth is called
(a) Epicentre (b) Hypocentre (c) Isoseists (d) Focal depth
6. Shear waves are also known as CO3- R
(a) Primary waves (b) Secondary waves (c) Love waves (d) Rayleigh's waves
7. For RC frame building without infill panels, the natural period of CO4- R
vibration estimated using the expression
(a) $T_a=0.075h^{0.75}$ (b) $T_a=0.085h^{0.75}$ (c) $T_a=0.09h/\sqrt{d}$ (d) $T_a=0.09/\sqrt{d}$

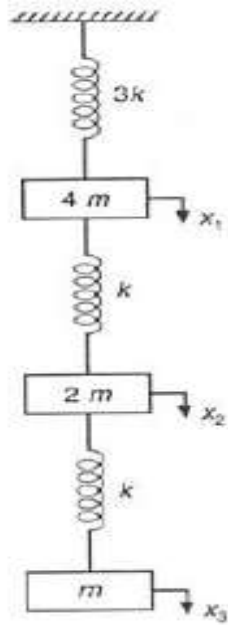
8. The graph showing the variation of the maximum response with natural frequency to a specified forcing function is known as CO4- R
- (a) Response spectrum (b) bauschinger
(c) Peak ground acceleration (d) seismogram
9. The tension steel ratio on any face, at any section, shall not be less than CO5- R
- (a) 0.24 (b) 0.22 (c) 0.23 (d) 0.21
10. The code used for design and detailing is CO5- R
- (a) IS 1893 (b) IS 13920 (c) IS 4326 (d) IS 456

PART – B (5 x 2= 10Marks)

11. What are the different methods of vibration analysis? CO1- R
12. What is meant by coupled and uncoupled equation of motion? CO2-U
13. What is meant by Seismogram? CO3-R
14. What is Pinching effect? CO4-U
15. List out the codes prescribed for longitudinal reinforcement requirements. CO5-R

PART – C (5 x 16= 80Marks)

16. (a) Derive the mathematical modeling of an SDOF system. CO1-App (16)
- Or
- (b) A SDOF system consists of a mass of 20kg, a spring of stiffness 2200N/m and a dashpot with a damping coefficient of 60 N-s/m is subjected to a harmonic excitation of $F=200\sin 5t$ N. Write the complete equation of motion CO1- App (16)
17. (a) State and Prove the orthogonality property of mode shapes. CO2- U (16)
- Or
- (b) Find the Natural frequency and mode shape of the system shown in figure. CO2- App (16)



18. (a) How earthquakes being measured. Explain them briefly. CO3-U (16)
- Or
- (b) With neat sketch explain the characteristics of strong ground motion. CO3-U (16)
19. (a) Explain step by step procedure for seismic analysis of RC buildings as per IS 1893:2002 CO4-U (16)
- Or
- (b) Explain in detail about Effects of Earthquake in different types of structures. CO4-U (16)
20. (a) A special reinforced concrete moment resisting frame building with infill panel is situated in Delhi. Height of the building is 12m. The building is resting on medium soil. The base dimensions of building at plinth level are 24 m. Determine the design horizontal seismic coefficient and vertical seismic coefficient for a damping of 2%. CO5- App (16)
- Or
- (b) Briefly describe the type of plan irregularities and vertical irregularities of buildings with neat sketches CO5- U (16)

