27/05/17 AN

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 71593

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2017.

Seventh Semester

Civil Engineering

CE 6701 — STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Describe D-Alembert's principle.
2. Classify the types of vibration.
3. What is fundamental frequency and fundamental mode?
4. Define Eigen vectors.
5. Define focus and epicenter.
6. Explain modified Mercalli intensity scale.
7. Explain the term Response reduction factor.
8. Write note on Bouchinger effect.
9. Write a short note on curvature ductility.
10. Write the formula for modal mass.

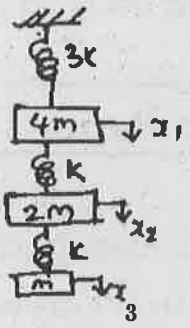
PART B — (5 × 16 = 80 marks)

11. (a) A vibrating system Consists of a mass of 5 kg, spring of stiffness 120 N/m and a damper with a damping co-efficient of 5 N-s/m. Calculate Damping factor, Natural frequency of the system, Logarithmic decrement, the ratio of two successive amplitude the number of cycles after which the initial amplitude reduces to 25%. (16)

Or

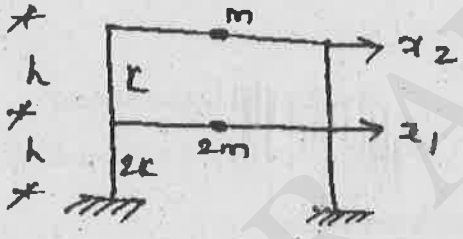
(b) Examine whether the log–decrement is also given by $\delta = 1/n \log(U_0/U_n)$ represents the amplitude after n cycles have elapsed. (16)

12. (a) Analyze the natural frequency and mode of the system. (16)



Or

(b) Solve the natural frequency and mode of vibration of the system. (16)



13. (a) (i) Explain the seismic waves with neat sketch. (10)

(ii) Discuss about the elastic rebound theory. (6)

Or

(b) Describe about the characteristics of strong ground motion with neat graph. (16)

14. (a) Write the step by step procedure for seismic analysis of RC buildings as per IS 1893:2002. (16)

Or

(b) List out the lessons learnt from the past earthquakes in India and explain it briefly. (16)

15. (a) Explain about the Earthquake design philosophy for masonry and RCC buildings. (16)

Or

(b) (i) Explain in detail about lateral load analysis. (6)

(ii) Explain in detail about detailing as per IS 13920 – 1993. (10)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 40820

08/05/18 AN

B.E./B.Tech. DEGREE EXAMINATION, APRIL/MAY 2018
Seventh Semester
Civil Engineering
CE 6701 – STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Use of 1893-2002 is permitted
Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. Define degrees of freedom.
2. State D'Alemberts principle.
3. What is fundamental frequency and fundamental mode shape ?
4. List out the assumptions made in the concept of shear building.
5. Differentiate between 'P-waves' and 'S-waves'.
6. Define Magnitude and Intensity of an earthquake.
7. What are the irregularities found on RC buildings during earthquake ?
8. What is base shear ?
9. Write down the design philosophies in the earthquake resistant structural design.
10. State the importance of ductility in RC structures.

PART – B (5×16=80 Marks)

11. a) A damped free vibration test is conducted to determine the dynamic properties of a one storey building. The mass of the building is 10,000 kg. Initial displacement of the building is 0.702 cm. Maximum displacement on the first cycle is 0.53 cm and period of this displacement cycle is 1.7s. Determine the effective weight, undamped frequency, logarithmic decrement, damping ratio, damping coefficient, damped frequency and the amplitude after 6 cycles.

(OR)

b) Derive the equation of motion for viscous damping.

12. a) State and prove Orthogonality and Normality principle of mode shapes.

(OR)

b) Determine the natural frequency and draw the mode shape for the shear building shown in figure 1.

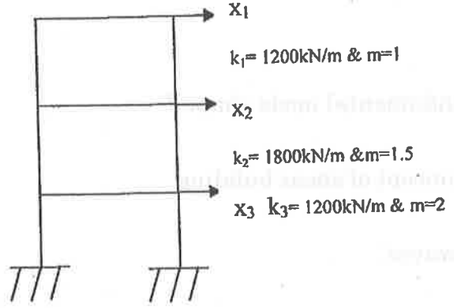


Figure 1

13. a) Explain in detail about plate tectonic theory. List some of the past earthquakes caused by plate tectonics.

(OR)

b) Describe about the characteristics of strong ground motion with a neat graph.

14. a) Explain the behavior of Prestressed concrete structures under earthquake loading.

(OR)

b) Determine the design lateral forces at each floor level for a two storey RC shear frame of a hospital building for the following data. Use response spectrum method of IS 1893-2002.

Seismic weight of each floor	= 50 kN
Spacing between columns	= 3 m C/C
Height of each floor	= 3 m
Type of structure	= Special moment resisting frame
Location of the building	= Coimbatore
Type of soil	= Rock

Combined stiffness of ground floor columns : 2000 kN/m

Combined stiffness of first floor columns : 1000 kN/m

15. a) Discuss the causes of damages occurred in RC building.

(OR)

b) Explain how confining reinforcement is done in columns as per IS 13920-1993.

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 52781

B.E./B.Tech. DEGREE EXAMINATIONS, APRIL/MAY 2019. 29-4-19

Seventh Semester

Civil Engineering

CE 6701 — STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

(Regulation 2013)

(Common to PTCE 6701 – Structural Dynamics and Earthquake for B.E. (Part-Time) Fifth Semester - Civil Engineering – Regulation 2014)

Time : Three hours Maximum : 100 marks

(Use IS : 1893 – 2002, IS 4326 – 1993, IS 13920 – 1993 are permitted)

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. List the various forms of damping.
2. Write the difference between static loading and dynamic loading.
3. Name the different modes of vibration.
4. Recall modal superposition method.
5. Rewrite the characteristic of earthquake.
6. Name the element of engineering seismology.
7. Compare Pinching effect with Bouchinger effect.
8. Predict the effect of earthquake in masonry structures.
9. Recall the causes of damage.
10. Write the concept of soft storey.

PART B — (5 × 13 = 65 marks)

11. (a) Free vibration test was conducted on an empty elevated water tank, through a cable attached to the tank, where a lateral force of 10 kN was applied it pulled the tank horizontally by 7.5 mm. The cable was suddenly cut and the resulting vibration was recorded. At the end of 4 complete cycles, the time was 2 sec and the amplitude was 5 mm. Determine.

(i) Weight of the tank

(ii) Absolute damping

(iii) Damped frequency

(iv) Number of cycles required for the displacement amplitude to decrease to 0.6 mm.

Or

(b) (i) Recall

(1) Free vibration

(2) Degree of freedom

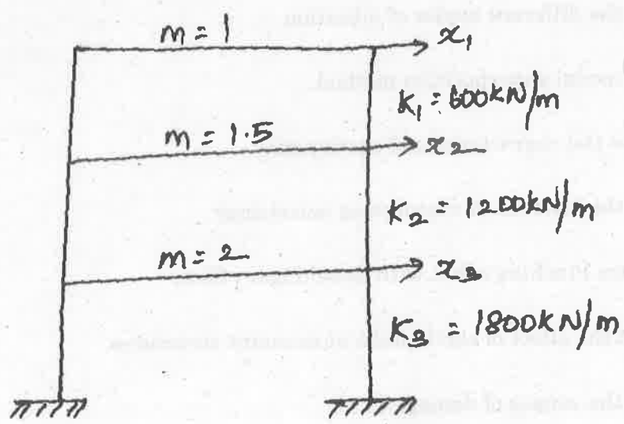
(3) Period.

(ii) State and explain D'Alembert principle.

12. (a) Derive the equation of Motion of Multi Degree of Freedom (MDOF) systems.

Or

(b) Determine the natural frequencies and mode shape for the shear building as shown in figure.



13. (a) Explain the following

(i) Plate Tectonic theory (6)

(ii) Elastic rebound theory. (7)

Or

(b) (i) Recall the method for the estimation of magnitude and intensity of earthquake. (7)

(ii) List the causes of earthquake. (6)

14. (a) Explain the behaviour of reinforced cement concrete structure under earthquake forces. (13)

Or

(b) Summarize the evaluation of earthquake forces as per IS 1893. (13)

15. (a) Explain the detailing of structural elements and confinement as per IS 13920-2016. (13)

Or

(b) Describe the planning considering and architectural concepts as per IS : 4326. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Reproduce the guidelines for earthquake resistance design of masonry buildings. (15)

Or

(b) A RC chimney idealized as a lumped mass cantilever is subjected at the top level to a step force of $F(t) = = 4500$ kN, Mass = 7×10^5 kg/m, $EI = 2 \times 10^{10}$ kN/m^2. Determine its response by treating it as a 2 DOF system. The height of the chimney is 16 m. (15)

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Reg. No. :

Question Paper Code : 50302

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2017
Seventh Semester
Civil Engineering
CE 6701 – STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING
(Regulations 2013)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.
(Codes IS 1893 : 2002 and IS 13920 : 1993 to be permitted)

PART – A (10×2=20 Marks)

1. Define logarithmic decrement.
2. State D-Alembert's principle.
3. Enumerate orthogonality and normality principles.
4. Write the equation of motion for an damped two degree of freedom system.
5. What is elastic rebound theory ?
6. Define fault and list its types.
7. Define response spectra.
8. Write short note on pounding effect in buildings.
9. Define diaphragm discontinuity.
10. Explain floating column.

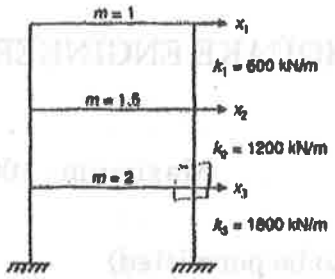
PART – B (5×16=80 Marks)

11. a) A machine foundation weighs 60 KN. The spring constant is 11000kN/m and dash constant (C) = 200 KN-s/m. Explain
    i) Whether the system is over damped, under damped or critically damped.
    ii) Determine Logarithmic decrement.
    iii) Determine Ratio of two successive amplitudes.
    If the initial displacement is 10 mm and initial velocity is zero displacement at t = 0.1s.

(OR)

b) A single degree of freedom system having a mass of 2.5 m is set into motion with a viscous damping and allowed to oscillate freely. The frequency of oscillation is found to be 20 Hz, and measure of the amplitude of vibration shows two successive amplitude to be 6 mm and 5.5 mm. Estimate the viscous damping co-efficient.

12. a) Evaluate the natural frequency and draw the mode shape for the shear building.



(OR)

b) Derive the equation of motion of a two degree of freedom system for free vibration.

13. a) List out the causes of earthquake and explain it briefly.

(OR)

b) Define focus and epicenter of an earthquake. Define surface and body waves and explain it with neat sketch.

14. a) Explain briefly the effect of earthquake on different types of structures.

(OR)

b) Discuss in detail about the methods of seismic analysis.

15. a) Write down the various earthquake resistant features that can be introduced in masonry building to make it earthquake resistant.

(OR)

b) Why ductility consideration is very important in earthquake resistant design of RC building ? Explain the ductile detailing considerations in flexural members as per IS 13920-1993.

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Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 20282

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2018.

Seventh Semester

Civil Engineering

CE 6701 — STRUCTURAL DYNAMICS AND EARTH QUAKE ENGINEERING

(Regulations 2013)

(Common to PTCE 6701 — Structural Dynamics and Earth Quake Engineering for B.E (Part-Time) – Fifth Semester – Civil Engineering – Regulations 2014)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. Explain De Alembert's principle

2. Brief about the SDOF system and free body diagram.

3. What is meant by mode super position technique?

4. Enumerate properties of stiffness matrix and mass matrix.

5. Classify the faults based on the direction of the movement of blocks.

6. What is meant by reservoir induced Earthquakes?

7. Brief short column damage in RC buildings.

8. Brief P- delta effects.

9. Define structural plan density.

10. Differentiate Weak storey and soft storey.

PART B — (5 × 13 = 65 marks)

11. (a) A machine of mass one tonne is acted upon by an external force of 2450 N at a frequency of 1500 rpm. To reduce the effects of vibration, isolator of rubber having a static deflection of 2 mm under the machine load and an estimated damping (=0.2) are used.

Determine

(i) the force transmitted to the foundation (6)

(ii) the amplitude of vibration of Machine. (7)

Or

(b) A SDOF system having a mass of 2.5 kg is set into motion with viscous damping and allowed to oscillate freely. The frequency of oscillation is found to be 20 Hz and the measurement of amplitude of vibration shows two successive amplitudes to be 6 mm and 5.5 mm. Determine the viscous damping coefficient. (13)

12. (a) Determine the natural frequencies of vibration of MDOF system by using matrix method as shown in figure 12 (a). (13)

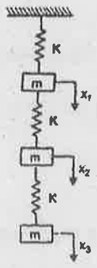


Fig 12 (a)

Or

(b) Determine the natural frequencies of the system as shown in figure 12 (b) by Holzer method. (13)

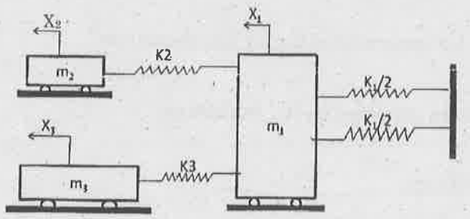


Fig (12) (b)

13. (a) (i) Explain elastic rebound theory. (5)

(ii) Explain the seismic susceptibility of Indian Subcontinent. (8)

Or

(b) Discuss ground subsidence, slope instability due to Earthquake and methods of evaluating liquefaction potential. (13)

14. (a) Elaborate the Planning and Architectural consideration in RC buildings and discuss the potential deficiencies of buildings exist in our society. (13)

Or

(b) Discuss the dynamic Analysis procedure of RC framed Structure as per IS 1893 :2002 with suitable assumed data of your choice. (13)

15. (a) Elaborate the seismic detailing requirements of a shear wall and elements of RC framed Structures as per IS: 13920-1993. (13)

Or

(b) Discuss the evaluation of stresses involved in masonry pier with a masonry building of your choice. (13)

PART C — (1 × 15 = 15 marks)

16. (a) Determine the natural frequencies of vibration and the ratio of the amplitudes of motion of mass m_1 and m_2 for the system shown in figure 16 (a) Here the stiffness is K1 between the support and mass 1. (15)

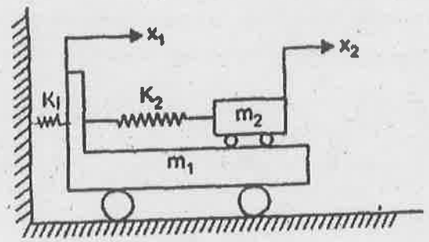


Fig 16 (a)

Or

(b) A damped free vibration test is conducted to determine the dynamic properties of a one storey building. The mass of the building is 10 tonne. Initial displacement of the building is 7.02 mm. Max displacement on the first cycle is 5.3 mm and the period of this displacement cycle is 1.7s. Determine the effective weight, undamped frequency, logarithmic decrement, dampngratio, damped frequency and the amplitude after 6 cycles. (15)

Reg. No. : | | | | | | | | | | | | |

Question Paper Code : 91316

B.E./B.Tech. DEGREE EXAMINATIONS, NOVEMBER/DECEMBER 2019

Seventh Semester

Civil Engineering

CE 6701 – STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

(Regulations 2013)

(Also Common to PTCE 6701 – Structural Dynamics and Earthquake Engineering for B.E. Part-Time Fifth Semester – Civil Engineering – Regulations 2014)

Time : Three Hours | Maximum : 100 Marks

Answer ALL questions.

PART – A **(10×2=20 Marks)**

1. Write the D'Alembert's principle of dynamic equilibrium.
2. Define logarithmic decrement method.
3. What is meant by multi degree of freedom system ?
4. Differentiate coupled and uncoupled equations of motion.
5. Define magnitude of earthquake.
6. Mention a few disastrous earthquakes that had occurred around the world.
7. What is the basis of Response spectrum theory ?
8. Define liquefaction.
9. What is meant by design horizontal seismic co-efficient ?
10. Write about base isolation technique.

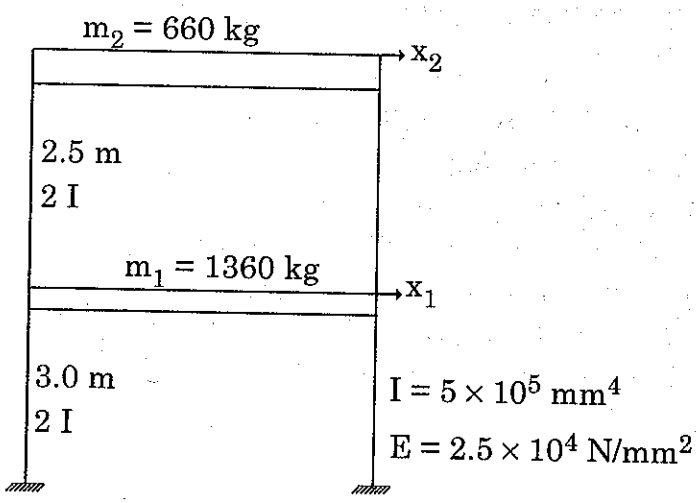
PART – B **(5×13=65 Marks)**

11. a) A vibrating system consisting of a weight of w = 50 N and a spring with stiffness of 4 N/mm is viscously damped. The ratio of two successive amplitudes is 1:0.85 compute
    a) natural frequency (undamped) of the system.
    b) logarithmetic decrement.
    c) damping ratio.
    d) the damping coefficient and
    e) damped natural frequency.

(OR)

b) Derive the equation of motion of a single degree of freedom system for free vibration and find the solution for
    a) Underdamped system.
    b) Overdamped system.

12. a) Determine the natural frequencies and mode shapes of the structure shown in fig.



(OR)

b) Derive orthogonality relation between the mode shapes of two degree of freedom system.

13. a) Explain in detail about Tectonic plate theory.

(OR)

b) Describe strong motion characteristics and elaborate its effects.

14. a) Enumerate the effect of earthquake on different types of structures with neat sketch.

(OR)

b) How will you construct a response spectrum diagram ? Enumerate the characteristics of response spectrum in detail.

15. a) What are the possible causes of damage in a building due to earthquake ?

(OR)

b) Explain the earthquake resistant design philosophy for buildings.

PART – C **(1×15=15 Marks)**

16. a) A platform of weight 18 kN is being supported by four equal columns which are clamped to the foundation. Experimentally, it has been computed that a static force 5 kN applied horizontally, to the platform produces a displacement of 2.5 mm. It is estimated that the damping in the structure is of the order of 5% of critical damping. Compute the following : (a) Undamped natural frequency. (b) Damping coefficient. (c) Logarithmic decrement. (d) No. of cycles and time required for amplitude of motion to be reduced from an initial value of 2.5 mm to 0.25 mm.

(OR)

b) Define Seismic waves. Elaborate the types of seismic waves in detail with neat sketch.

Reg. No. | | | | | | | | | | | | |

Question Paper Code : 80223

12(11) 16 FN

B.E./B.Tech. DEGREE EXAMINATION, NOVEMBER/DECEMBER 2016.

Seventh Semester

Civil Engineering

CE 6703 – WATER RESOURCES AND IRRIGATION ENGINEERING

(Regulations 2013)

Time : Three hours Maximum : 100 marks

Answer ALL questions.

PART A — (10 × 2 = 20 marks)

1. What are the two important standards for irrigation water?
2. Define flood walls.
3. Define consumptive use of surface water.
4. What is multipurpose reservoir?
5. What are canal regulators?
6. Define Duty, Delta and Base period.
7. What is the need for water budget?
8. What is the purpose of canal lining?
9. Why drop irrigation is preferred?
10. Define micro irrigation.

PART B — (5 × 16 = 80 marks)

11. (a) Briefly state the various steps needed for planning an irrigation project. List the various objectives of water resources development in the context of the lesser developed countries.

Or

(b) What are the various water sources used for irrigation? How is the storage capacity of a large reservoir fed by a rier for a large irrigation project determined?

12. (a) Outline briefly the concept of ground water budgeting and its importance in the determination of the safe yield from a basin.

Or

(b) What are the quality criteria for irrigation water? Show the relationship between the different parameters. Classify the irrigation water based on various parameters.

13. (a) What is meant by transpiration by plants? Do you consider it an evil as it causes water loss from the soil and plants? What does transpiration coefficient means?

Or

(b) Suggest a method for estimating the consumptive use of crops over a large area. Classify the consumption use of water by crop based on its estimation during specific periods.

14. (a) What are cross drainage work? What is necessity of such a work in a canal project, and how does this necessity is fulfilled by such water?

Or

(b) List the different types of canal lining in common use. Draw a neat sketch of a typical cross section of a canal carrying a discharge of 60 m^3/sec and lined with brick in cement motor. Mark the salient features on the sketch.

15. (a) What is tank irrigation? Differentiate between isolated tanks and Group tanks. How can compute the storage capacity of an irrigation tank?

Or

(b) What is participating irrigation management? Give a case study of the above type of management and explain.
