Reg. No. :

Question Paper Code: 47104

B.E. / B.Tech. DEGREE EXAMINATION, NOV 2018

Seventh Semester

Civil Engineering

14UCE704 - STRUCTURAL DYNAMICS AND EARTHQUAKE ENGINEERING

(Note: Use of IS 13920:1993, IS 4326:1993 and IS 1893(Part 1):2002 are permitted in the End Semester Examinations)

(Regulation 2014)

Duration: Three hours   Maximum: 100 Marks

Answer ALL Questions

PART A - (10 x 1 = 10 Marks)

1. Unit of stiffness is **……….**

   (a) Kg-m/s^2 (b) N-s/m

   (c) N/m   (d) N-s/m^2

2. Natural frequency of suspended frequency is

   (a) $\omega_{n} = \sqrt{\dfrac{k}{m}}$ (b) $\omega_{n} = \sqrt{\dfrac{m}{k}}$ (c) $\omega_{n} = \sqrt{\dfrac{1}{km}}$ (d) None of the above

3. The graphical representations of the relative amplitude of the two co – ordinates and their phase angle relationship is called as

   (a) Bending moment diagram   (b) Moher's diagram

   (c) Mode shape diagram   (d) Shear force diagram

4. Shear building is defined as ……..

    (a) Rotation   (b) No rotation

    (c) Translation   (d) No translation

5. The movements of plates towards each other and collide

    (a) Divergent boundary   (b) Convergent boundary

    (c) Transform boundary   (d) Plate boundary

6. For an ideal Rigid building, Time Period is

    (a) greater than one   (b) less than zero   (c) greater than zero   (d) equal to zero

7. Response spectrum represents by :

    (a) IS 1839 : 2002   (b) IS 1893 : 2001   (c) IS 1839 : 2001   (d) IS 1893 : 2002

8. The ratio between ultimate deformation to initial yielding

    (a) Dilation factor   (b) Moment distribution

    (c) Ductility factor   (d) Damping factor

9. The formula for design base shear (Vb) is

    (a) $A_h W$ (b) $A_h W/4$ (c) $A_h W/3$ (d) $A_h W/2$

10. Indian standard guidelines for improving earthquake resistant of earthen building is:

    (a) IS 13827 : 1993   (b) IS 13828 : 1993

    (c) IS 13826 : 1993   (d) IS 13826 : 1992

PART - B (5 x 2 = 10 Marks)

11. What is mean by vibration?.

12. Explain the concept of Decoupling of equations.

13. What are the causes of Earthquake?

14. What is bouchinger effect?

15. What is the need of ductility?

PART - C (5 x 16 = 80 Marks)

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16. (a) (i) Explain the equivalent stiffness of the spring. How do calculate the equivalent
stiffness of the spring when the spring connected parallel and series. (8)
(ii) Derive the equation of motion for single degree of freedom with free vibration by
following methods: (8)
(a) D Alembert's principle
(b) Energy methods.

Or

(b) (i) Find the natural frequency of the system as shown in Figure1.1. Take $k_1 = k_2 =$
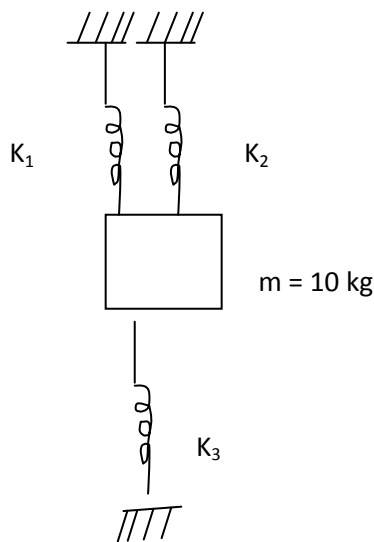1500 N/m, k_3 = 2000 N/m and mass 'm' = 10kg. (10)

Figure : 1.1

(ii) Explain different types of damper with neat sketch. (6)

17. (a) Explain in detail about the concept of modal superposition method. (16)

Or

(b) An undammed single degree of freedom system (m = 30 kg, k = 500 N/m) is given
an initial displacement of 10 mm and initial velocity of 75 mm/s. Find (16)
(a)The natural frequency
(b)The period of vibration
(c)The amplitude of motion
(d)The time at which the second and third maximum peak occurs.

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18. (a) Explain in detail about the behavior of RCC, Steel and prestressed concrete Structures under earthquake loading. (16)

Or

(b) (i) What is meant by liquefaction of the soil? Explain any four methods to control.

(8)

(ii) Explain different types of seismic waves in detail with sketch. (8)

19. (a) Explain the importance of ductility in earthquake resistant structures. (16)

Or

(b) (i) Explain design spectrum. And how it's differs from response spectra? (8)

(ii) Explain the concept of design? (8)

20. (a) (i) Explain the Guidelines given by IS 4326– 1993 for Earthquake resistant design.
(8)

(ii) Explain in detail, how do you calculate the base shear in a building with zone factor and importance factor? (8)

Or

(b) Explain the importance of ductility in earthquake resistant design of RC buildings and the factors affecting ductility.. (16)

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