(Following Paper ID and Roll No. to be filled in your Answer Book)

PAPER ID : 100858 Roll No. 1 0 6 2 1 0 0 0 9 9

B.Tech.

(SEM. VIII) THEORY EXAMINATION 2013-14

EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Time : 3 Hours *Total Marks : 100*

Note : (1) Attempt **all** questions.
(2) Assume any missing data suitably.
(3) Support you answer with help of neat sketch.
(4) Use of IS:1893 (Part 1) : 2002 is allowed.

1. Attempt any **four** parts of the following : **(5×4=20)**
   (a) Define the following terms :
      (i) Focus
      (ii) Epicenter
      (iii) Magnitude
      (iv) Intensity
      (v) Isoseismal
   (b) Explain various causes of Earthquake.
   (c) Give the various classifications of Earthquakes.
   (d) Discuss the characteristics of waves generated during earthquake.

(e) The standard torsion seismograph records a trace amplitude 8.9 mm long in N-S direction and 6.5 mm in E-W direction. The distance to the epicentre is estimated as 112 km. The station correction is +0.1. The distance correction is +3.1. Determine the average magnitude of the earthquake.

(f) Discuss the effect of plan configuration and vertical irregularity on performance of building.

2. Attempt any **four** parts of the following : (5×4=20

(a) Derive the expressions for free vibrations of undamped systems having single degree of freedom, with suitable diagram.

(b) In an experiment of free vibration, it is found that the maximum amplitude has reduced to 0.4 times its value in 3 complete cycles. Determine the damping in the system.

(c) What do you understand by Magnification Factor. Give its properties with the help of curve.

(d) A vibrating system of mass 3 kg is suspended by a spring of stiffness 1200 N/m and is subjected to harmonic excitation of 20N with damping coefficient, C = 75 N sec./m. Determine :

(i) Resonant frequency.

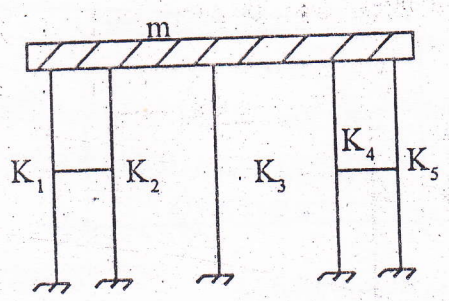
(ii) Phase angle at resonance.

(iii) Amplitude at resonance.

(iv) Damped circular frequency.

(e) What is Response Spectrum ?

(f) A mass (m) is connected through 5 springs (K_1 & K_2, K_4 & K_5 in pairs in series). Determine the natural period.

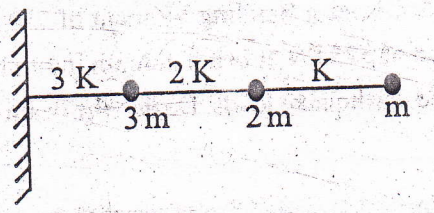


$K_1 = 1000$ N/cm
$K_2 = 800$ N/cm
$K_3 = 500$ N/cm
$K_4 = 900$ N/cm
$K_5 = 600$ N/cm
$m = 2000$ Kg

3. Attempt any **two** parts of the following : **(10×2=20)**

(a) Describe the Holzer method to analyze the MDOF systems.

(b) For the system shown, draw the mathematical model and find the fundamental frequency of vibration using Rayleigh's method.



(c) State Rayleigh's method and derive its expression.

4. Attempt any **two** parts of the following : **(10×2=20)**

(a) Design an unreinforced 6 m high masonary shear wall as shown, using following data :

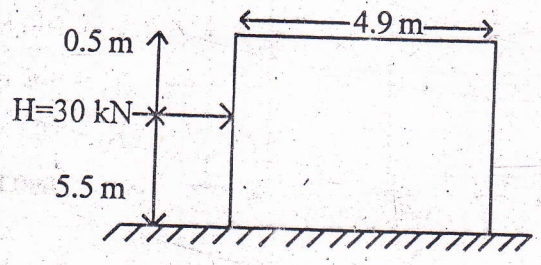
Unit weight of wall = 20 kN/m³

Prism structure of Masonary = 10 MPa

Seismic force, H = 30 kN.

No Superimposed Load.

Assuming wall thickness = 400 mm.



(b) Explain Time History Method.

(c) Explain the step by step procedure to calculate the base shear of building according to IS:1893-2002.

5. Attempt any **one** part of the following : **(20×1=20)**

(a) A R.C.C. frame consists of beams of span 6 m c/c. A floor inner beam carries a Bending Moment of 450 kNm and a shear force of 325 kN at beam column joint phase due to gravity and earthquake loads. Design the beam section for ductility.

(b) Explain Machine Foundation and also give its classification. Write the name of code and give its provisions for design and construction of foundations for impact type machines.