DCLEVI/DELVI

Term-End Examination

June, 2012

BICEE-006 : EARTHQUAKE ENGINEERING

Time : 2 hours   *Maximum Marks : 70*

Note : Question No-1 *is* compulsory. *Answer* any five *questions. Assume missing data if any.*

1. Write **True** or **False**, of the following :   7x2=14

    (a) Rayleigh waves and love waves are the surface waves. (T/F)

    (b) Epicentre is the point on the earth surface vertically above the points in the crust where seismic rupture begins. (T/F)

    (c) There are five seismic zones according to seismic zoning map of IS : 1893-2002 (T/F)

    (d) Delhi is in zone-IV according to the seismic. zoning map of IS : 1893-2002 (T/F)

    (e) Soft storeys type construction is less vulnerable for earthquake. (T/F)

    (f) Determination of base shear for earthquake resistant design of structures is given in IS 1893 (Part 2) : 2002 (T/F)

(g) The code IS 13920 : 1993 entitled "Ductile detailing of reinforced concrete structures subjected to seismic forces-code of practice" (T/F)

2. Derive the response of single degree of freedom (SDF) System to a harmonic loading $P(t) = P_0 \sin wt$. P_0 is the amplitude of the force and its frequency 'w' is called the forcing frequency. Consider harmonic vibration with viscous damping. **14**

3. A mass 'm' is attached to the midpoint of a beam of length 'L'. The mass of the beam is small in comparison to 'm'. Determine the spring constant and the frequency of the free vibration of the beam in vertical direction. The beam has a uniform flexural rigidity EI. **14**
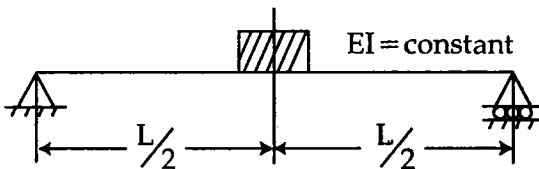
4. Write step-by-step procedure for seismic analysis of a three storeyed RC Building as per IS 1893 (Part 1) : 2002 by response spectrum method. **14**

5. Write the ductility consideration in earthquake resistant design of RC Building as per IS 13920 : 1993. **14**

6. Write the retrofitting and strengthening techniques for five storeys hospital Building. **14**

7. Write short notes on *any four* : 3½x4=14

   (a) Equivalent static method

   (b) Plate tectonic theory

   (c) Principle of earthquake resistant design

   (d) Effect of structural irregularities during earthquake

   (e) Duhamel Integral

   (f) Earthquake measurement

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