

DCLEVI/DELVI
DIPLOMA ENGINEERING

Term-End Examination

December, 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) P-waves and S-waves are the surface waves. (T/F)
 - (b) There are four seismic zones according to seismic zoning map of IS : 1893 - 2002. (T/F)
 - (c) Guwahati is in zone V according to the seismic zoning map of IS : 1893 - 2002. (T/F)
 - (d) Soft stories type construction is more vulnerable for earthquake excitation. (T/F)
 - (e) Natural frequency of damped system (ω_D) is less than the natural frequency of undamped system. (T/F)
 - (f) Ductility is an essential attribute of an earthquake resistant design of structure that serves as a shock absorber in a structure and reduces the transmitted force to one that is sustainable. (T/F)

(g) More the height of the building lesser is the natural frequency. (T/F)

2. Derive the response of single degree of freedom (SDF) system to a harmonic loading $p(t) = p_0 \sin \omega t$. p_0 is the amplitude of the force and its frequency ' ω ' is called the forcing frequency. Consider harmonic vibration with no damping. **14**

3. Determine the natural frequency of the system shown in Fig. 1 consisting of weight of 50.7 N attached to a horizontal cantilever beam through the spring K_2 . The cantilever beam has a thickness

$t = \frac{1}{4}$ cm, a width $b = 1$ cm. Modulus of Elasticity

' E ' = 30×10^5 N/cm², and a length of 12.5 cm.

The spring has a stiffness, $K_2 = 10.69$ N/cm.

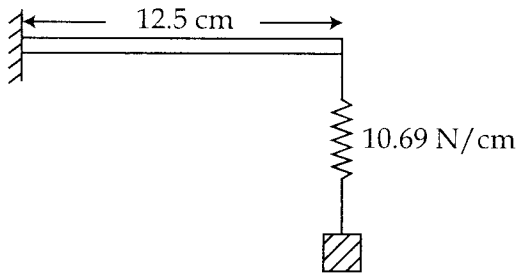


Fig. 1

50.7 N

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

5. Write step-by-step procedure for seismic analysis of a four storeyed RC Building as per IS 1893 (part-1) : 2002 by equivalent static method. **14**
6. Write the retrofitting and strengthening techniques of RC Building. **14**
7. Write short notes on *any four* : **4x3.5=14**
- (a) Seismic waves
 - (b) Structural irregularities
 - (c) Response spectrum method
 - (d) Time-history method
 - (e) Cause of earthquake
 - (f) Duhamel integral
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