B.Tech. DEGREE EXAMINATION, MAY - 2015

(Examination at the End of Final Year)

CIVIL ENGINEERING

Paper - II : Earthquake Engineering

Time : 3 Hours   **Maximum Marks : 75**

Answer question No.1 compulsory   *(15)*

Answer ONE question from each unit   *(4 × 15 = 60)*

1)   a)   Write the equation of motion of a single degree of freedom system.

     b)   Mention the basic concepts of vibration.

     c)   Write the comparison of static loading and dynamic loading.

     d)   What is the purpose of Seismic Zoning.

     e)   Expand DSHA and PSHA.

     f)   What do you mean by free and forced vibrations.

     g)   What are the sources of Earthquake.

     h)   What is the significance of response spectrum.

     i)   What is Hypocenter?

     j)   Define Epicenter?

     k)   How is seismology different from earthquake engineering.

     l)   Define Critical Damping.

m) List out commonly used types of seismic dampers?

n) How does liquefaction get affected by the towering of ground water table.

o) What do you mean by soft storey.

UNIT – I

2) Derive the Fourier series expression for the given periodic loading function and write the expression for the steady state response of an SDOF system. **(15)**

OR

3) For the frame shown in Fig, obtain the fundamental mode frequency. **(15)**

Take $M_1 = M_2 = 400$ kN – s^2/m, $M_3 = 500$ kN – s^2/m, $K_1 = 12 \times 10^4$ kN/m,

$K_2 = 24 \times 10^4$ kN/m and $K_3 = 48 \times 10^4$ kN/m. Sketch the mode shapes.
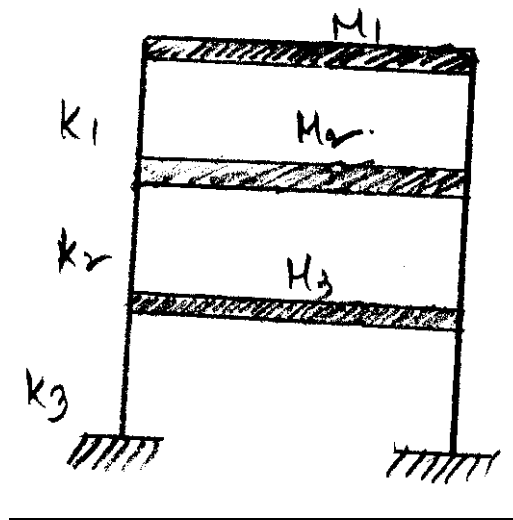
UNIT - II

4) a) What are the factors influencing ground motion. **(7½)**

b) Write a brief note on identification of earthquake sources. **(7½)**

OR

5) Explain in detail different factors responsible for liquefaction. **(15)**

UNIT – III

6) Explain with sketches, the different types of damages in masonry caused by earthquakes. **(15)**

OR

7) A one-storeyed building located in zone-V, has plan dimensions of 4m × 4m and 4m height. Four columns of dimensions 230mm × 230mm are located at the four corners of the building. The size

of the beams is 230mm × 300mm. The thickness of the slab is 150mm. Live load on the roof slab is 2kN/m^2. The soil below the building is of medium type. Analyse the frame for a load combination of dead load and earthquake load. **(15)**

UNIT - IV

8) a) Write a brief note on the following : **(10)**

   i)   Local Retrofit Strategies.

   ii)   Global retrofit strategies.

   b) How typical damage and failure of steel structures are noticed. **(5)**

OR

9) What are the different repair techniques for damages in masonry caused by earthquakes. **(15)**

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