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BICEE-011

B.Tech. CIVIL ENGINEERING (BTCLEVI)

Term-End Examination

December, 2016

00673

BICEE-011 : EARTHQUAKE RESISTANT DESIGN OF STRUCTURES

Time : 3 hours *Maximum Marks : 70*

Note : *Assume any missing data suitably. Use of IS : 1893-2002 is allowed. Attempt any* ***five*** *questions. All questions carry equal marks. Use of scientific calculator is permitted.*

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1. Write short notes on any ***two*** of the following : *2×7=14*

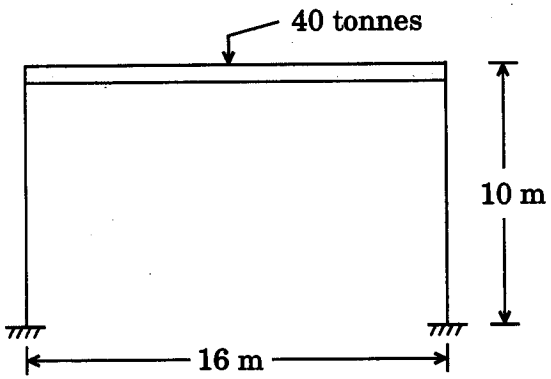
(a) Magnitude and Intensity of Earthquake

(b) Theory of Plate Tectonics

(c) Response Spectrum

2. Derive the expression for damped SDOF system. *14*

3. A steel portal frame is subjected to free vibration by giving an initial displacement without velocity. Taking the damping as 4% of critical, find the characteristics of the motion. The total mass of 40 tonnes is lumped at roof level so that the columns, which are 10 m high and 16 m apart, can be taken as weightless. Take $E = 2{\cdot}1 \times 10^{11}$ N/m^3 and the moment of interia of each column as 0·0008 m^4. *14*

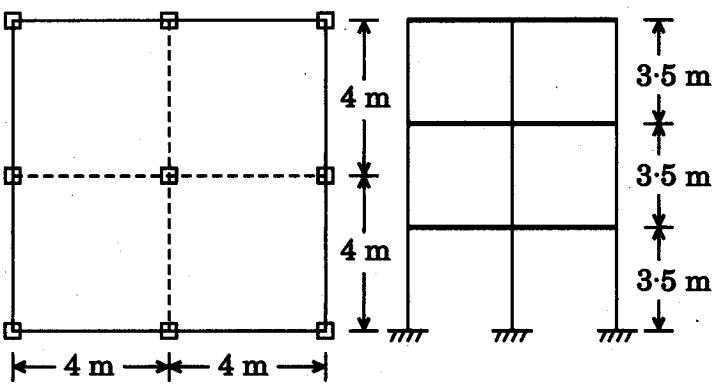


4. (a) Simplicity and symmetry are the keys of making a building earthquake resistant. Explain the concept with the help of examples. *7*

(b) Discuss the various approaches to deal with the problems associated with non-structural elements. *7*

5. A reinforced concrete chimney of height 30 m is located in seismic zone IV. Let the outer diameter at the base and top be 3·0 m and 2·0 m respectively. Let the wall thickness of the structural shell be 30 cm throughout the height. Let there be a lining 10 cm thick. It is required to evaluate the earthquake forces on this chimney. *14*

6. The plan and elevation of a three-storey RCC school building is shown in the figure given below. The building is located in seismic zone V. The type of soil encountered is medium stiff and it is proposed to design the building with special moment-resisting frames. The intensity of dead load is 10 kN/m^2 and the floors are to cater to an imposed load of 3 kN/m^2. Determine the design seismic loads on the structure by static analysis. *14*



(a) Plan (b) Elevation