Code No: **RT42013C**

R13

Set No. 1

IV B.Tech II Semester Regular Examinations, April/May - 2017
EARTHQUAKE RESISTANT DESIGN
(Civil Engineering)

Time: 3 hours   **Max. Marks: 70**

Question paper consists of Part-A and Part-B
Answer ALL sub questions from Part-A
Answer any THREE questions from Part-B
1893 Code book Permitted
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PART–A *(22 Marks)*

1. a) Explain the seismic zonation of India.   [4]
    b) Define Dynamic magnification factor and explain its significance?   [4]
    c) Explain the design of building with dual system.   [4]
    d) What are the parameters influencing the response reduction factor.   [3]
    e) Explain the importance of strong column-weak beam concept of earthquake
       resistant design of buildings.   [4]
    f) What are the various methods of seismic analysis of buildings?   [3]

PART–B *(3×16 = 48 Marks)*

2. a) Explain the characteristics of different types of seismic waves.   [8]
    b) Explain the influence of local site effects on the response of a structure during an
       earthquake.   [8]

3. a) Derive the equation of motion of a damped SDOF system subjected to forced
       vibrations. Assume m = mass, k = stiffness coefficient, c = damping coefficient
       and $F(t)$ = Excitation force.   [8]
    b) A SDOF structure of weight *600 kN* is set into free vibration by releasing it from
       an initial displacement of *75 mm*. The maximum displacement after one complete
       oscillations is *60 mm* and it occurs in *0.5 sec*. Evaluate the following:
       (i) Logarithmic decrement and the associated damping ratio
       (ii) Undamped natural frequency
       (iii) Coefficient of damping and
       (iv) Stiffness coefficient.   [8]

4. a) Explain the building architectural considerations for effective seismic design.   [8]
    b) Explain the factors influencing the torsion of a structure and the methods to
       handle torsion in a building.   [8]

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5. a) Determine the design seismic load on each frame of a four-storeyed reinforced concrete residential building, plan and elevation, shown in Fig.1. The building is to be constructed in Nellore. The soil condition is medium soil. The reinforced concrete frames are to be filled with brick masonry. The lumped weight due to dead load is 2 kN/sq.m on floors and1 kN/sq.m on roof. The live load on the floors is 3 kN/sq.m and 1 kN/sq.m on roof.

3.5 m

3.5 m

3.5 m

4 m

Y

3 @ 5 m = 15 m

X

4 @ 4 m = 16 m
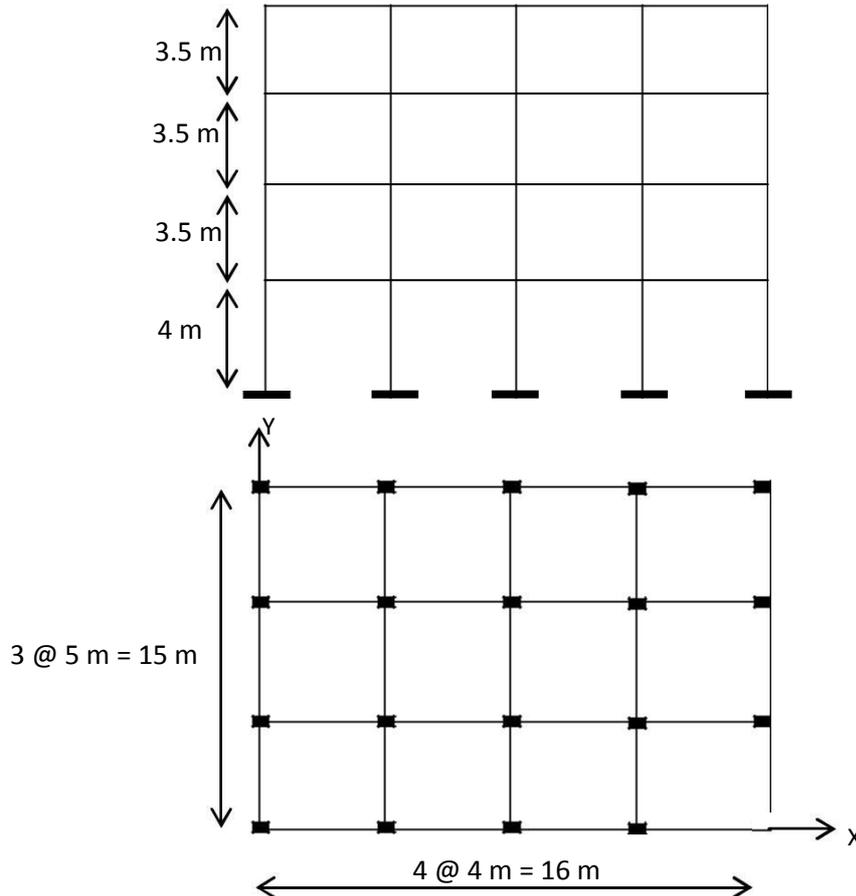
Fig.1   [16]

6. a) Explain the necessity of ductile detailing of the elements of an RCC frame. [8]
   b) Draw the ductile detailing provisions of an RC column member and explain its salient features. [8]

7. a) Determine the lateral force distribution on a building frame shown in Fig.2, located in Delhi on rocky soil. Assume $m = 2000$ kg and $k = 400$ kN/m. [12]
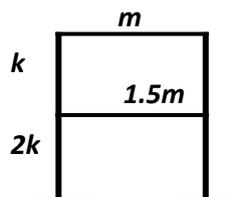
m

k

1.5m

2k

Fig. 2

b) Explain the method of estimation of natural frequency of vibration of buildings.[4]

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