[5462] - 545
M.E. (Civil- Structures Engineering)
ANALYSIS AND DESIGN OF EARTHQUAKE RESISTANT STRUCTURES
(2017 Pattern) (Semester - III) (End Semester)

Time : 3 Hours]

[Max. Marks :50

Instructions to the candidates:

1) *Attempt Q.1 or Q.2, Q.3 or Q.4, Q.5 or Q.6 and Q.7 or Q.8.*
2) *Neat diagrams must be drawn wherever necessary.*
3) *Figures to the right side indicate full marks.*
4) *Assume suitable data, if necessary and clearly state.*
5) *Use of cell phone is prohibited in the examination hall.*
6) *Use of electronic pocket calculator is allowed.*
7) *IS 1893 is allowed.*

Q1) a) Elaborate basic difference between Magnitude and Intensity. **[5]**

 b) Explain philosophy of earthquake resistant design. **[4]**

OR

Q2) a) What is liquefaction? State its effect on structures. **[5]**

  b) Define response spectra and Give the uses of a response spectrum. **[4]**

Q3) Brief note on vertical and horizontal irregularities in multistoried buildings. **[9]**

OR

Q4) a) A building having non uniform distribution of mass in Fig1 locate its center of mass. **[5]**

Fig 1
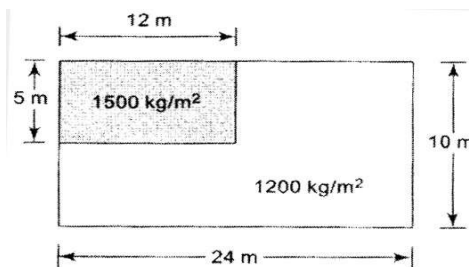
  b) Explain capacity based design and performance based design. **[4]**

Q5) a) A RCC beam of rectangular section has to carry a distributed live load of 20kN/m in addition to its own weight and a dead load of 25kN/m. The maximum bending moment and shear force due to earthquake are 60 kN-m and 40 kN-m respectively. Centre to centre distance between supports is 6m. Design the beam using M20 grade concrete and Fe 415 steel. **[12]**

b) Explain detailing of beams as per IS code provisions. **[4]**

OR

Q6) a) Design and detailing of shear wall the shear wall of length 11.4 m and thickness 200mm. it is subjected to the following forces: **[10]**

Factored axial force Pu=8550 kN

Factored Bending Moment= 47392.9 kN-m

Factored Shear force= 2063.2 kN

Material F_{ck} = 25 N/mm$_2$, Fe= 415 N/mm^2

b) Why weak beam and strong column combination are considered to be more earthquake resistant than strong beam and weak column combination? **[6]**

Q7) a) State IS 3370 code provisions for water tanks. Write design procedure for water tank. **[8]**

b) What is the deference in structural behavior of long and short shear walls? Discuss the concept of flanged shear wall. **[8]**
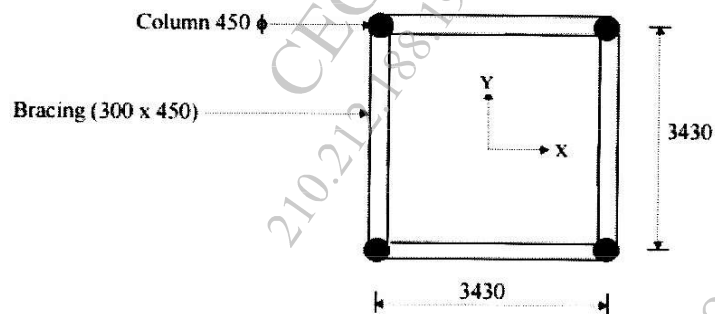
OR

Q8) A RC circular water container of 50 m3 capacity has internal diameter of 4.65 m and height of 3.3 m (including freeboard of 0.3 m). It is supported on RC staging consisting of 4 columns of 450 mm dia with horizontal bracings of 300 x 450 mm at four levels. The lowest supply level is 12 m above ground level. Staging conforms to ductile detailing as per IS13920.

Staging columns have isolated rectangular footings at a depth of 2m from ground level. Tank is located on soft soil in seismic zone II. Grade of staging concrete and steel are M20 and Fe 415, respectively dendity of concrete is 25 kN/m³. Analyze the tank for seismic loads upto base moment. **[16]**
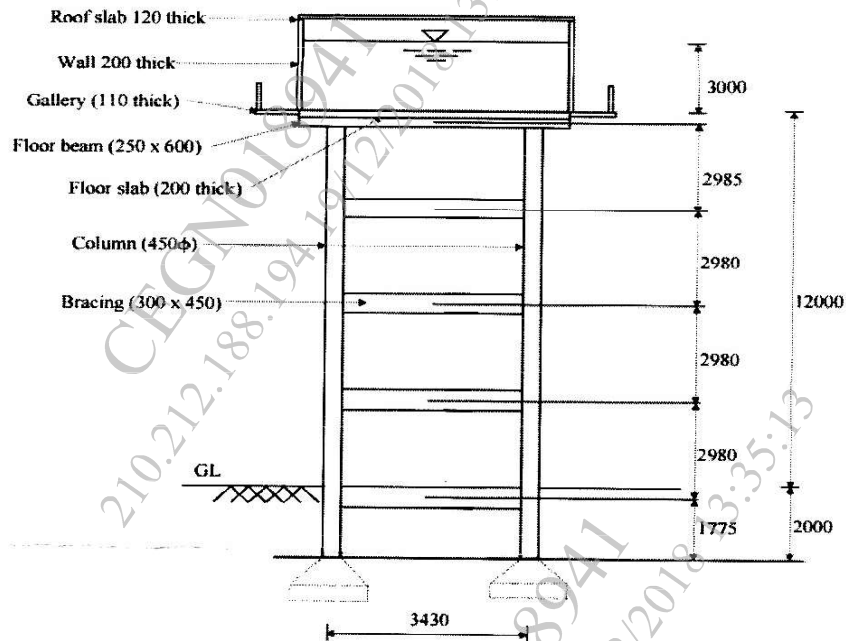
(a) Elevation

(b) Plan

(All dimensions in mm)

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