Paper Code: STR-22	Roll No.										

M. Tech.
(SEM- II) EVEN SEMESTER EXAMINATION, 2015-16
EARTHQUAKE ANALYSIS & DESIGN OF STRUCTURES

[Time: 3 hrs.]   **[Max. Marks: 100]**

Note: (i) Attempt ALL Questions.
(ii) All Questions carry equal marks.
(iii) Seismic codes are allowed

1. Attempt any **four** parts of the following: -   **[5x4=20]**

   (a) What do you understand by plan irregularities? Describe the behavior of open ground story during earthquake.
   (b) Describe the behavior of vertical reinforcement in brick masonry. How it transfer the earthquake forces to the ground?
   (c) Define bands. At what level in a masonry building would you provide them? Give justification for each of them.
   (d) Discuss the lap splices to be provided in beam and columns for earthquake resistant structures.
   (e) Discus the different non destructive tests to be carried out to evaluate the strength of the building.

2. Attempt any **one** part of the following:-   **[20x1=20]**

   (a) A three story framed structure is to be analyzed for earthquake forces for the following data:
   Zone = V,   plan = 45mx30m,   story height = 4 m, Wall thickness = 125 mm,   live load = 4.0 kN/sqm,   column size 300x450,   beam size = 250x450, Beam grid = 5mx5m in both x and z directions. slab depth = 150 mm, Determine seismic force in each column at each floor level.

   (b) How shear walls are effective to prevent seismic forces during earthquake? Discuss the design criteria for a reinforced concrete shear wall as per IS code.

3. Attempt any **two** parts of the following   **[10x2=20]**

   (a) Determine the frequency and design seismic coefficient A_h, for an ordinary masonry shear wall in a primary health centre at Dehradun , for the following data:
   Height of the wall h = 3.0 m,   width of the wall = 0.25 m,   roof load = 20 kN/m
   Unit weight of wall = 20 kN/m^3 Assume horizontal force at top = 15 kN,
    Horizontal displacement at top = 0.125 m , soil type = hard soil

   (b) Determine the lateral force on a two story un - reinforced residential masonry building situated in Allahabad for the following data:
    Plan size 20m x 20m, height of the building = 6.0 m   weight of the roof =5.0 kN/m^2
   Weight of wall = 5.0 kN/m   live load on floor = 4 kN/m^2 soil type = I

(c) Determine the rigidity of shear wall in terms of Et where E = elastic modulus and t = thickness of wall in the following fig.
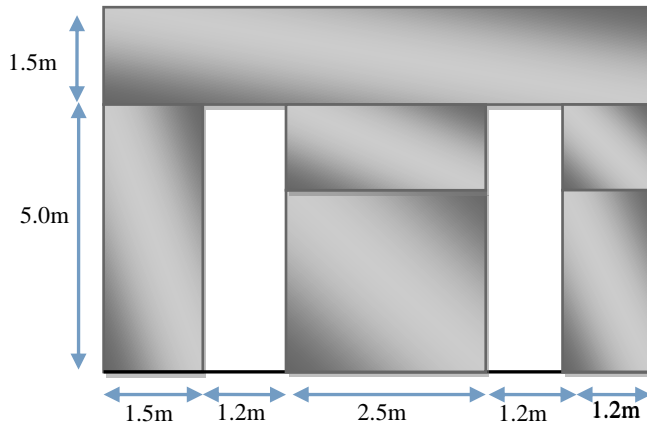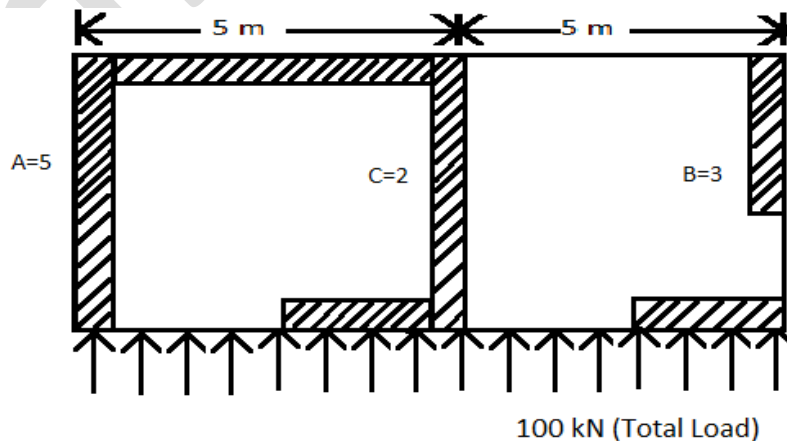

4. Attempt any **two** parts of the following   **[10x2=20]**

(a) Considering the rigid diaphragm connection with the brick masonry wall discuss the steps to determine direct shear forces and Torsional shear forces in the following building plan;

(b) A RCC building damaged during Nepal earthquake 2015. Retrofitting work is required to fit for rehabilitation. What do you meant by the conditional assessment of the building? Describe the steps to be followed in detail.

(c) Distribute a Seismic load of 100 kN in end shear wall A, B and C in case of rigid and Flexible Diagram.

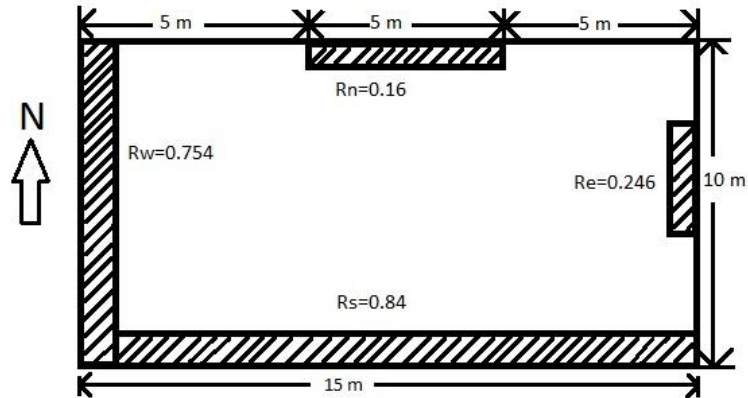5. Attempt any **TWO** parts of the following   **[10x2=20]**

   (a) Calculate the torsional shear forces in one storey shear wall masonry structure with a rigid diaphragm roof. Given data:

   All walls are a total of 5m height, 4 m up to roof level and 1 m parapet.
   Seismic zone V.   Weight on roof : 3 kN/m^2 Weight on wall : 5 kN/m^2
   Base shear   : 300 kN

   (b) In above question determine the increase in Axial Stresses due to torsion.

   (c) What do you mean by confinement of concrete? Discuss the confinement of beam column joint in frame structure.