R09

Code No: D2009

JAWAHARLAL NEHRU TECHNOLOGICAL UNIVERSITY HYDERABAD
M.TECH II - SEMESTER EXAMINATIONS, APRIL/MAY 2012
EARTHQUAKE RESISTANT DESIGN OF BUILDINGS
(STRUCTURAL ENGINEERING)

Time: 3hours **Max. Marks: 60**

Answer any five questions
All questions carry equal marks

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Code permitted to be used IS 1893:2002

1.a) How are seismic waves classified? Sketch and show with respect to direction of propagation of wave movement of particles during transmission of seismic waves.
b) What is the Energy released in an earthquake? In what units it is measured?

2.a) With respect to configuration, how buildings are classified as regular and irregular buildings?
b) Taking the example of a typical irregular building, show by means of sketches how the lateral load path gets affected because of the irregularity. What precautions in analysis and design are considered necessary for such buildings as per IS 1893:2002?

3.a) How the effect of soil considered in the response spectrum analysis?
b) For a R.C.C building with a period T= 1.5 sec (other parameters remaining the same) what will be the maximum magnification of the design seismic force between hard soil and soft soil when we use Equivalent lateral force method?
c) Under what circumstances time history method of analysis resorted to?

4. A RCC building has 4 stories (G+3) with floor heights of 3.00 m. The building is provided with infill walls of 230 mm thick in brick work. The building has transversely 2 spans of 3.0m each. Longitudinally the columns are spaced at 5.0 m intervals. The building is made of rigid jointed frame the building is in seismic Zone IV and to be built in hard soil. The seismic weight per floor per bay is 48.0 tonnes and for roof it is 32.0 tonnes. Using simple equivalent static lateral force methods compute the base shear for a typical bay. Distribute the base shear vertically and show by sketches the seismic force and shear distribution along the height.

5.a) Explain the behavior of a masonry short wall under in-plane and out of plane bending.
b) In design, how is combined effect of axial and in plane bending considered in a masonry wall?
c) What are the methods of improving the seismic resistance of masonry buildings?

6.a) What are the advantages of providing Shear Walls?
b) What is meant by a Short Cantilever Shear wall? Indicate by a sketch how the behavior of Tall shear wall is different from that of a Short wall?
c) What are the considerations used for locating the shear walls in the plan of a building? Explain with sketches.

7.a) Distinguish between curvature ductility and displacement ductility of a cantilever beam.

b) Enunciate the three reasons why closely spaced laterals are preferred in earthquake resistant design of columns.

c) What are the special splicing requirements for column main bars as per IS 13920:1993?

8.a) What do you understand by capacity design? Explain.

b) A beam of cross section 300mm x 400mm and Span of 4.0m is reinforced with 4-20 diameter Fy- 415 bars at bottom and 2-16 diameter Fy- 415 bars at top with a clear cover of 30 mm. Assuming the live load it carries is equal to its dead weight, design the shear reinforcements for the beam to satisfy the capacity design principles as per IS 13920:1993. Sketch and show the reinforcement details for the beam.

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