[Time: Three Hours]   **[Marks:80]**

Please check whether you have got the right question paper.

N.B: 1. Question.No.1 is compulsory.
        2. Solve any three questions from remaining questions.
        3. IS 1893-2002 (Part-I) is permitted.
        4. Assume any suitable data if required and justify the same.

Q.1 a) State the asssumption made in the analysis of earthquake. resistant design of buildings.   **05**
        b) Explain the i) Response Spectrum method,   **05**
        c) Explain the Time History method.   **05**
        d) What are the causes of instability of steel buildings? Discuss the P-delta effect.   **05**

Q.2 a) Design the reinforcement for a column of size 450mm×450mm, subjected to the following forces. the column **10**
        has an unsupported length of 3.0m and is braced against side sway in both directions.
        Use M25/Fe415
        Axial load → Dead load=1000 KN
                      Live load=800 KN
                      Seismic load = 550 KN
        And Moment   Dead load= 50 KNm
                      Live load=40 KNm
                      Seismic load=100 KVm
        Use percentage of steel required=3%

        b) Design the RCC beam for the following data live load=30Kn/m, dead load=20KN/m Max.BM and SF due to   **10**
        earthquake are 100 KNm and 80KN. effective span of beam is 5 m. Use M20/Fe415.

Q.3   A ten storey OMRF building has plan dimensions as shown in fig.1 the storey height is 3.0 m. The dead load is **20**
        4KN/m² weight of the partitions on the floor can be assumed to be 2KN/m², Live load on the floor is 3 KN/ m²
        and on the roof is 1.5KN/m². The soil below the foundation is hard and building is located in Mumbai.
   Detemine the seismic forces and shears at different floor levels.

plan
Fig. ①

1
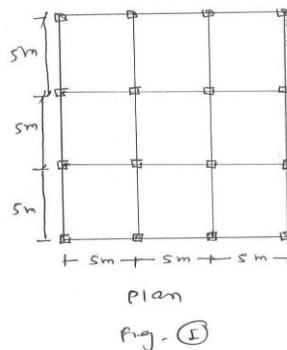
Q.4 a) Explain with sketches failure mechanism of in filled frame.   **10**

b) Explain equivalent diagonal strut method for analysis of infilled frames   **10**
   i.   Infilled wall without opening
   ii.   Infilled wall with opening

Q.5   A simple one storey building has two shear walls in each direction as shown in Fig.It has some gravity columns that are not shown. All four walls are in M25 grade of concrete, 200mm thick and 5m long. The storey height is 4m. Design shear force on the building is 200 KN in either direction. Determine design lateral forces on different shear walls.
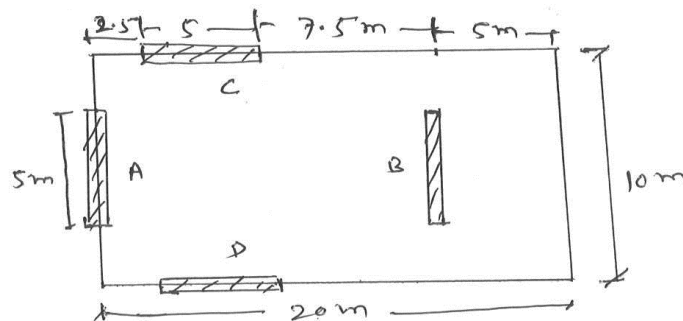
Q.6   Design the Ductile shear wall to resist the seismic forces using following data and refers fig (2). Max SF at base V=1000KN Max.Bm at base, M=14000 KNm, axial load is 3000KN. Take partial safety factor 1.5 use M20/Fe415, and size of all beams and columns 300 mm × 400 mm
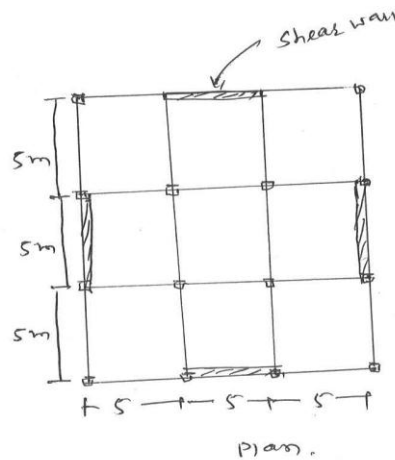

Fig. ②