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RM-7051

B. E. - III (Sem. VI) (Civil) Examination

May / June – 2010

Structural Design & Drawing - I

Time : 4 Hours] [Total Marks : **100**

Instructions :

(1)

નીચે દર્શાવેલ ☛ નિશાનીવાળી વિગતો ઉત્તરવહી પર અવશ્ય લખવી.
Fillup strictly the details of ☛ signs on your answer book.

Name of the Examination :

☛ B. E. - 3 (Sem. 6) (Civil)

Name of the Subject :

☛ Structural Design & Drawing - I

☛ Subject Code No. : 7 0 5 1 ☛ Section No. (1, 2,.....) : 1&2

Seat No. :

Student's Signature

(2) Use of IS 456 and IS 875 is permitted.

(3) Wherever not mentioned, the materials are M_{20} and Fe415.

(4) Assume suitable data if necessary and mention them clearly.

(5) Neatly drawn pencil sketches will earn special credits.

SECTION - I

1 (a) Determine the anchorage length of bars shown in figure 1 at the simply supported end of the RCC beam; if it is subjected to an ultimate shear force of 300 kN. **10**

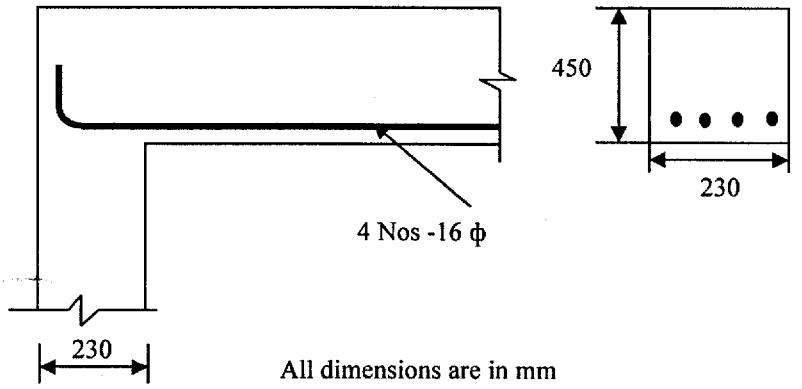

Fig. 1

(b) A T-beam of effective flange width 1500 mm, thickness of slab 100 mm, width of rib 300 mm and effective depth 560 mm is reinforced with 4-25 mm dia. bars. Calculate the ultimate moment of resistance. Materials are M_{15} and Fe415 grade of steel. **15**

If it is reinforced with 5-25 mm dia. bar, calculate ultimate moment of resistance.

OR

(b) A hall has clear dimension 3m × 9m with wall thickness 230 mm. The live load on the slab is 3 kN/m^2 and a finishing load of 1kN/m^2 may be assumed. Design of slab must include all checks and draw clear view of slab with reinforcement details.

2 Design a three span continuous beam ABCD supporting a 120 mm thick slab as shown in figure 2. Consider Live load 4.5 kN/m^2 and Floor finish 1.5 kN/m^2.

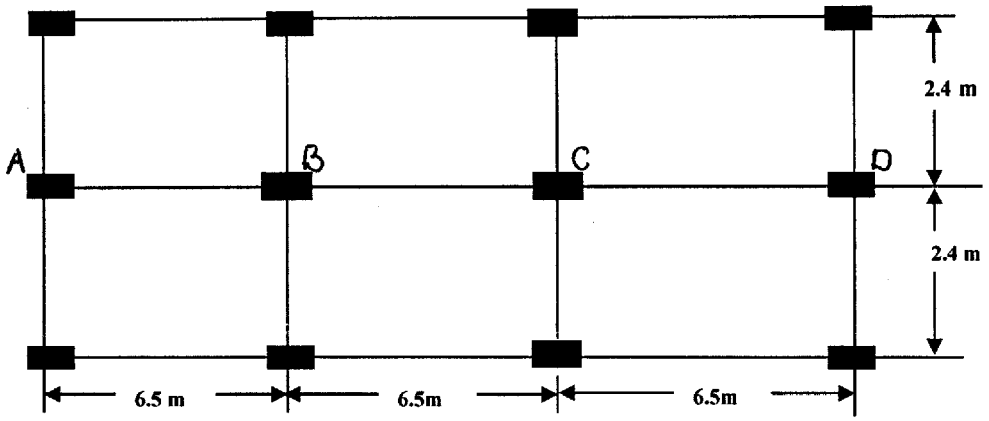

Fig.2

(a) Show complete analysis of beam for shear force and bending moments. Also draw SFD and BMD. **10**

(b) Work out all structural design calculations for two types of sections (Tee beam and doubly reinforced beam) **15**

Structural design must be supported by proper checks and neat details sketches of reinforcement in both cases.

SECTION - II

3 A circular column of 420 mm diameter is reinforced with 8 nos of 16 mm ϕ bar of Fe415 grade steel along with helicol reinforcement. The effective length of column is 3m. Compute the service load for this column. Check for ecentricity and design the helical reinforcement. Assume grade of concrete M_{30}. **10**

OR

3 Design a square column for a working load of 12300 kN. The effective length of column is 3m. check for icentricity, design lateral lies and also sketch the cross section. Assume grade of concrete M_{20} and grade of steel Fe415.

4 Design a square (sloping or spread) footing for a square column of size 400 mm × 400 mm. The column carries a factored design load of 2100 kN. Asume grade of steel Fe415, grade of concrete M20 and safe bearing capacity 200 kN/m_{20}. Check for one way whear, two way shear and sketch the reinforcement details.

5 The internal dimension of a dog legged staircase is

4750 mm × 2400 mm. The landing slabs span in the same direction as the stair and are supported by the walls at the ends. Design the stair slab. The tread is 250 mm, riser is 160 mm and thickness of wall is 300 mm. The number of treads in each flight is 10. The width of landing is equal at both ends.

Assume grade of concrete M_{20} and grade of steel Fe415 and adopt a live load of 3 kN/m^2.

Draw a neat sketch of reinforcement details.