CAI1323

Structural Design & Drawing - I
(New) (1010)

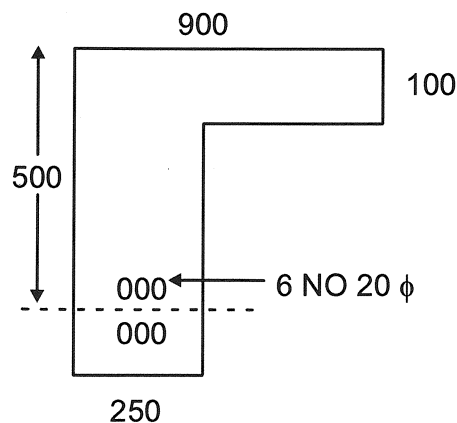P. Pages : 2

Time : Four Hours

Max. Marks : 100

Instructions to Candidates :
1. Do not write anything on question paper except Seat No.
2. Answersheet should be written with blue ink only. Graph or diagram should be drawn with the same pen being used for writing paper or black HB pencil.
3. Students should note, no supplement will be provided.
4. Solve **any one** question from each unit.
5. Use of IS 456 is allowed.
6. Use of non-programmable calculator is allowed.

UNIT - I

1. a) Explain properties of balanced section. **5**

   b) Design a rectangular RC Beam simply supported on effective span of 5.5 m subjected to a working udl of 23 kN/m. Assume width of beam 230 mm. Concrete grade is M20 & steel Fe 415. **20**

2. a) Explain limit state method of design of RC structure. **5**

   b) Find safe load a RC beam can carry on a simply supported span of 4.8 m if it's c/s is as shown below. Assume concrete grade M20, steel Fe 415 & Factor of safety 2.5. **20**

900

100

500

000 ← 6 NO 20 φ

000

250

UNIT - II

3. Design shear r/f for a beam of effective size 300 x 700 mm and reinfored with 7 nos 20ϕ bars at bottom. Beam carries working load of 90 kN/m an effective span of 6.23 m. Assume concrete grade M20 & steel Fe415. **25**

4. A RC Beam has size 250 x 600 mm and carries ultimate moment of 380 kNm. Design reinforcement for the beam. Assume M20 grade concrete & Fe 415 steel. Use effective cover of 40 mm. A table of f_{sc} values are given in following for various ϵ_{sc} values. **25**

ϵ_{sc}	0.00144	0.00163	0.00192	0.00241	0.00276	0.00380
f_{sc}	288.7	306.7	324.8	342.8	351.8	360.9

UNIT - III

5. An interior panel of RC slab has effective span of 4.2 x 5.2 m. Design the slab for a live load of $4 \, kN/m^2$ & floor finish of $2 \, kN/m^2$. Use M20 grade concrete & Fe 415 steel. **25**

6. A RC slab is simply supported on all 4 sides with corners free to lift. Effective span is 4.2 m x 5.2 m. Design the slab for

$$LL = 4 \, kN/m^2, FF = 2 \, \frac{kN}{m^2} \cdot f_{ck} = 20 \, MPa \quad f_y = 415 \, MPa.$$ **25**

UNIT - IV

7. Design a circular column of diameter 550 mm to carry an ultimate axial load of 3000 kN. Use M20 grade conc and Fe415 steel. Effective length of column = 2.6 m. **25**

8. Design a square footing for circular column of diameter 550 mm carrying ultimate axial load of 3000 kN. Use M20 grade concrete & Fe 415 steel. SBC of soil strata is $320 \, kN/m^2$. cover to r/f is 40 mm effective. **25**

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