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Structural Design & Drawing - I
(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. Answer sheet 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. Figures to right indicate full marks.
6. Use of calculator & IS 456 is allowed.
7. Assume suitable data wherever required.

UNIT - I

1. a) Explain : **9**

i) Balanced section.

ii) Under reinforced section.

iii) Over reinforced section.

b) Find tension reinforcement required for a RC beam of size 230x500 mm overall, if it carries a BM of 55 kNm. Use M20 & Fe415 grades. **16**

2. a) Explain partial safety factors for **5**

i) Loads.

ii) Material strengths.

b) Find depth of N.A. & ultimate moment of resistance for RC section 230x450 mm overall size having 3 No 12 TOR bars on tension side. Also find balanced moment of resistance. **20**

UNIT – II

3. a) State & explain various factors affecting shear resistance of R.C. members. **5**

b) A simply supported R.C. beam, of size 380x750 mm overall, carries a udl of 84 kN/m including s/w; over a span of 6m. The beam is reinforced with 6 No 22 mm dia bars of grade Fe500 on tension side. Design the shear r/f using vertical stirrups. **20**

4. Calculate ultimate moment of resistance of L beam for following data : **25**

i) Flange width = 1200 mm
ii) depth of slab = 110 mm
iii) Effective depth = 600 mm
iv) Width of web = 300 mm
v) Material Grades = M22, Fe460.
vi) Tension steel = 7 No 25 mm dia TOR.

UNIT – III

5. Design a RC slab of inner size 4.5x5.5m. The slab is simply supported on wall of 300 mm width on all 4 sides. The slab carries live load of 3 kN/m^2. Floor finish is 1 kN/m^2. Use M20 & Fe415 grades. Assume corners are free to lift. **25**

6. Design a dog-legged staircase for a residential building having floor to floor height of 3.2 m size of staircase is 4.65 m x 2.6 m effective. Width of landing is 1.2 m. Use M20 & Fe415 grades. **25**

UNIT – IV

7. Design a column of effective length 3.0 m carrying service load of 1600 kN. Use M20 & Fe415 grades.

a) Using square column of size 400 mm x 400 mm **12**
b) Using circular column of dia 450 mm. **13**

8. Design an isolated rectangular footing of uniform thickness for RC column bearing a load of 700 kN. Size of column is 230 x 530 mm. SBC of strata is 150 kN/m^2. Use M20 & Fe415 grades. **25**

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