

(c) The ultimate strain in concrete in bending is assumed in the IS code is

- (i) 0.002
- ~~(ii) 0.0035~~
- (iii) 0.003
- (iv) 0.004

(d) The maximum spacing of a vertical stirrup is

- (i) 1.0d
- ~~(ii) 0.75d or 300 mm whichever is less~~
- (iii) 300 mm
- (iv) 1.0d or 300 mm whichever is less

(e) The effective length of a column with fixed end is

- (i) 1.0L
- (ii) 1.2L
- ~~(iii) 0.5L~~
- (iv) 0.75L

(f) The minimum dia of longitudinal bar to be used in a column is

- (i) 10 mm
- (ii) 12 mm
- (iii) 16 mm
- (iv) 8 mm

B.Tech. 6th Semester Exam., 2014

DESIGN OF CONCRETE STRUCTURE—I

Time : 3 hours

Full Marks : 70

Instructions :

- (i) All questions carry equal marks.
- (ii) There are **NINE** questions in this paper.
- (iii) Attempt **FIVE** questions in all
- (iv) Question No. 1 is compulsory.

1. Choose the correct option from any seven of the following :

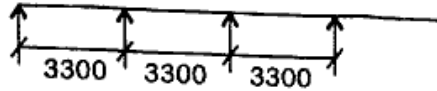
(a) The unit weight of R-C members can be assumed as

- (i) 23 kN/m³
- (ii) 24 kN/m³
- ~~(iii) 25 kN/m³~~
- (iv) 30 kN/m³

(b) The earthquake on a Richter scale 7 is

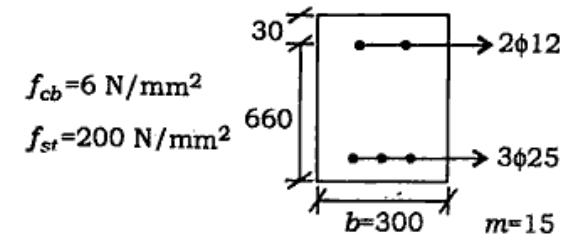
- (i) 10 times larger than magnitude 6
- (ii) 7/6 times larger than magnitude 6
- (iii) 7 times larger than magnitude 6
- (iv) None of the above

6. Design a one-way slab continuous over several supports shown in the figure below. Use M-20 and Fe 415 steel length effective = 3300 mm :



7. Design the reinforcement in a column of size 450 mm × 600 mm subject to an axial load of 2000 kN under service load. The column has an unsupported length of 3 m and is braced against sideway in both directions. Use M-20 concrete and Fe 415 steel.
8. Design a spiral circular column subjected to an unfactored load of 1600 kN. Effective length of column is 3.5 m. Use M-25 concrete and Fe 415 grade steel.
9. Design an isolated footing for a square column (450 × 450) mm² reinforced with 8φ25 and carrying a service load of 2300 kN. Safe bearing capacity = 300 kN/m² at a depth of 1.5 m. Assume M-20 concrete and Fe 415.

Find the M_R of the rectangular section as shown in the figure below :



3. Determine the area of steel for a beam to support a live load of 12 kN/m on a single span of 8 m using concrete M-15 and steel HYSD bar Fe 415 grade in mild exposure condition.
4. Design a rectangular beam to carry live load of 12 kN/m of span 6 m, when the effective depth is restricted to 650 mm and width of beam is 300 mm. Use M-20 concrete and Fe 415 steel.
5. Determine the ultimate moment of resistance for the T-sections where—
- b_f = flange width = 850 mm;
 - D_f = flange depth = 100 mm;
 - b_w = web width = 250 mm;
 - d_{eff} = effective depth = 520 mm
 - A_{st} = 6φ28;
 - t_y = 250 N/mm²;
 - f_{ck} = 20 N/mm².