

Attempt any four questions from Q-2 to Q-8

- Q-2** **Attempt all questions** (14)
- a) A drawing room of a residential building measures $4.3\text{m} \times 6.55\text{m}$. It is supported on 350 mm thick walls on all four sides. The slab is simply supported at edges with no provision to resist torsion at corners. Design the slab using grade M-20 concrete and HYSD bar of Fe-415. 14
- Q-3** **Attempt all questions** (14)
- a) Design a simply supported steel beam of span 7m carrying R.C.C slab capable of providing lateral restraint to the top compression flange. The beam is subjected to total u.d.l of 100 kN dead load excluding self weight plus 150kN imposed load. In addition, the beam carries a point load at mid span made up 50kN dead load and 50 kN imposed load. 14
- Q-4** **Attempt all questions** (14)
- a) Calculate the moment carrying capacity of a 3m long ISMB 350 beam which has full torsional restraint and no warping restraint at ends only. 7
- b) A Short R.C.C. column is to carry a factored load of 1900 kN. If the column is to be a square, design the column. Assume Minimum eccentricity is less than 0.05D. use M20 grade of concrete and Fe-250 grade of steel. 7
- Q-5** **Attempt all questions** (14)
- a) Calculate the compressive strength of a single angle strut ISA $100 \times 75 \times 10\text{mm}$ with centre to centre length of 1.5 m. Angle is loaded through one leg and ends are fixed. Consider 1 bolt at the each end. Take $f_y = 250\text{MPa}$. 7
- b) Determine area of tension reinforcement for T-beam to resist factored moment 300 kN.m. use M-20 and Fe-415 Steel. 7
Flange Dimension = $1400 \times 100\text{mm}$.
width of web = 300 mm
Effective Depth = 700 mm .
- Q-6** **Attempt all questions** (14)
- a) An angle section $90 \times 90 \times 8\text{mm}$ is to be connected to gusset plate by 6 mm fillet weld on sides and at the end of the member. The member is carrying tensile load of 120 kN. Design the welded connection. Assume Steel grade Fe 410 and fillet welding. 7
- b) A singly RC beam $250\text{mm} \times 500\text{mm}$ is reinforced with 3 Nos . 20mm diameter bars at an effective cover of 30mm. Effective span of the beam is 4m. Find allowable superimposed load on the beam. 7
- Q-7** **Attempt all questions** (14)
- a) An RCC Column of size $350\text{mm} \times 350\text{mm}$ reinforced with 8 no.16 mm diameter carries a characteristic load of 800 kN. The allowable bearing pressure on soil is 200kN/m^2 . Design an isolated square pad footing. Use M20 and Fe 415 for both the column and footing. 10
- b) Explain the Limit state of Collapse in Flexure. 4
- Q-8** **Attempt all questions** (14)
- a) 30kN/m u.d.l. is acting on a two span continuous beam. Each support is simply supported. Design the beam using plastic method. Take $f_y = 250\text{N/mm}^2$. 7
- b) A simply supported rectangular beam of size $250\text{mm} \times 500\text{mm}$ effective depth is reinforced with 4-18mm diameter M.S bars as tension reinforcement beam is 7



subjected to factored shear force of 160 kN at support. Design the shear reinforcement with two bent up bars at 45° from steel and 8mm diameter M.S stirrups grade of concrete M-20.

