Structural Engineering

Important 13mark questions

Unit I

1. Design a cantilever beam of 3.0m span carrying a live load of 15kN/m. Use M20 and Fe415.
2. A reinforced concrete simply supported beam 200mm wide and 500mm deep effective is reinforced with 3 Nos. of 16mm diameter bars. Find the moment of resistance of the beam. Effective span is 5.0m. Find the safe working load. If the effective cover is 40mm, Find superimposed load. M20 and Fe250 are used.

Unit II

1. Design a RC lintel for a clear opening of 1.5m resting over a brick wall of 300mm. The height of the wall above the lintel is 1.2m. The unit weight of masonry is 19kN/m^3. Use M20 and Fe 250.
2. A RC beam has an effective size of 250mm × 550mm. It is subjected to a total working load including self-weight of 30kN/m on a span of 6m. It is provided with 4 members of 22mm dia bars in tension at support. Design the shear reinforcement. M20 concrete is used. Adopt Fe250 steel.

Unit III

1. Design a simply supported one-way slab for a clear span of 3.8m with 300mm walls. Adopt live load of 5000N/mm^2. Use M20 and Fe415 steel.
2. Design the flight slab of a dog legged staircase for a room 2.5m × 4.5m. The live load is 5.0kN/m^2. Tread is 250mm and rise is 160mm. Steps are of reinforced concrete. M20 and Fe415 are used. Landing slab and flight slab spans are in perpendicular direction. Height of floor is 3.2m

Unit IV

1. Design a square column with lateral ties to carry an axial load of 1200kN using M20 concrete and Fe415 steel. Length of column is 3.5m and is effectively held in position at both ends and restrained against rotation at one end.
2. A rectangular column 400mm×600 mm carries an axial load of 700kN. Design a rectangular footing of uniform thickness if safe bearing capacity of soil is 100kN/m^2. Use M20 and Fe250.

Unit V

1. An ISLB 400@569N/m is used as a laterally restrained simply supported beam on an effective span of 5m. Determine the maximum udl it can carry in addition to its self-weight, if the yield stress of steel is 250N/mm^2 and the deflection at mid span shall not exceed 25mm.
2. Design a single angle tension member to carry a tensile force of 250kN due to dead load and live load. The angle is to be connected to a gusset of plate through one of its leg by fillet welding. f_y = 250N/mm^2, f_U=410N/mm^2.