KATHMANDU UNIVERSITY
End Semester Examination
June/July, 2023

03 JUL 2023

Level : B.E./B.Tech.
Year : III
Time : 2 hrs. 30 mins.

Course : CIEG 310
Semester : II
F. M. : 40

SECTION "B"

Attempt *ALL* questions. *IS456:2000, IS 1343 (for prestressed concrete) and IS456-SP-16 is allowed to use. Assume suitable data if necessary.*

1. **Design & Detail** a Simply Supported rectangular beam for an effective span of 7 meter. The superimposed load (excluding self-weight) is 80 kN/m and the size of the beam is limited to 35 cm × 60 cm (overall). Use M25 and Fe 500 grade steel. Furthermore, check for (a) Development length at support (b) Deflection. [6+1+1= 8]

2. A Series of Beam spaced at 2.5 meter center to center are supported on masonry walls and the effective span of beam is 6 meter. The slab thickness is 100 mm and the ribs below the slab are 200 mm wide and 300 mm deep. If the slab and beam are so cast as to act together (monolithic), determine the reinforcement at mid span for the intermediate T-beam to carry an imposed load of 4kN/m^2 of the slab. Use M25 and Fe-500. [5]

3. **Design and Detail** a slab **panel S1** for a slab system supported on a masonry wall of 230 mm thick as in figure 1. (all dimensions are in mm). Assume floor finish load of 1 kN/m^2 and Live load of 4 kN/m^2. Use M20 concrete and Fe 415 steel. [6]

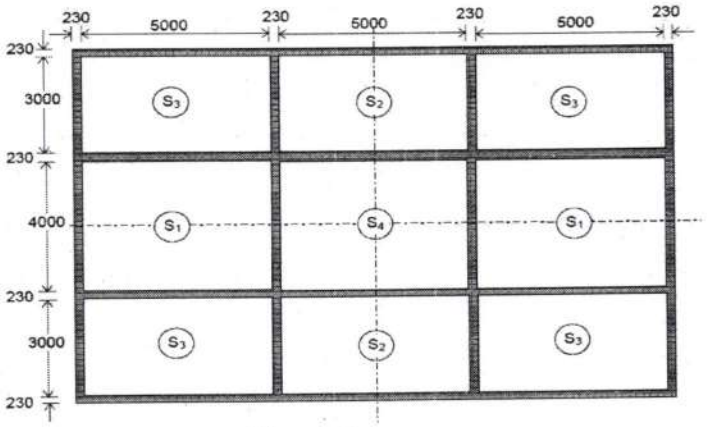

Figure 1

4. **Design and detail** a dog legged staircase for an office building, given the following data:
   - Height between floor = 3.2 meter
   - Riser = 160 mm, Tread = 270 mm
   - Width of flight = width of landing = 1250 mm
   - Live load = 5 kN/m^2 and assume 10% of total load as floor finish
   - Assume the stairs to be supported on 230 mm thick masonry walls at the outer edges of the landing (parallel to the risers).
   - Use M20 and Fe 415. [7]

OR

a. Discuss on the merits and demerits of prestressed concrete. [2]
b. Explain with the help of sketch about shear failure modes of RC beam. [2]
c. Determine **MOR** of beam having width 250 mm & depth 400 mm (effective), containing 3 number of 12 mm diameter bar in tension face. M20 and Fe415. [3]

5. **Design** a short RC Circular Column with helical reinforcement to take an axial factored load of 5000 kN. Use M25 and Fe500 for longitudinal reinforcement. [6]

6. A solid footing has to transfer a dead load of 1200 kN and an imposed (live) load of 800 kN from a square column 600 mm × 600mm (with 20 mm bars). Assuming safe bearing capacity of soil to be 250 kN/m^2, **design & detail** the footing. Use M20 and Fe 415. [8]