



ELIZADE UNIVERSITY, ILARA-MOKIN
FACULTY OF ENGINEERING
DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING
SECOND SEMESTER 2018/2019 EXAMINATIONS
B. Sc. CIVIL ENGINEERING

Course Title: DESIGN OF STRUCTURES I **Course Code:** CVE 308
Instruction: Attempt ANY FOUR questions **Units:** 3
Time allowed: 3 hours.

Question 1 (25 marks)

- a) State the factors affecting choice of reinforced concrete in structure? (5 marks)
- b) Itemize various structural elements in a building structure (5 marks)
- c) Explain the working principle of reinforced concrete (5 marks)
- d) Explain the stages required in structural design process (5 marks)
- e) What are characteristic and design strengths? (5 marks)

Question 2 (25 marks)

- a) Explain the following terms
 - i) Partial factor of safety and state its importance (4 marks)
 - ii) Dead load, Imposed Load and Wind load (4 marks)
 - iii) Building regulations and code of practice (4 marks)
- b) Design the longitudinal reinforcement for a 300mm square column which supports an axial load of 1700kN at the ultimate limit state. The characteristic material strengths are $f_y = 460\text{N/mm}^2$ for reinforcement and $f_{cu} = 30\text{N/mm}^2$ for the concrete. (13 marks)

Question 3 (25 marks)

The structural layout in Figure Q3 is a suspended floor of a proposed Engineering building for Elizade University, calculate the bending reinforcement and check the deflection for;

- a) Slab Panel 1 (13 marks)
 - b) Beam 2 (12 marks)
- Given: $f_{cu} = 30\text{N/mm}^2$; $f_y = 460\text{N/mm}^2$; cover to be 25mm; imposed load on beam $q_k = 20\text{ kN/m}$; assuming Y12 and Y20 bars are to be used for slab and beam reinforcement respectively.

Question 4 (25 marks)

- a) Explain different types of slab and their application in structural engineering (13 marks)
- b) With reference to the structural layout in Figure Q3; calculate
 - i) the bending reinforcement and (6 marks)
 - ii) check the deflection of slab panel 2 (6 marks)

Question 5 (25 marks)

- a) With reference to the structural layout in Figure Q3; calculate the effective width of
 i) Beam 1 and (1 mark)
 ii) Beam 4 if they are to be designed as flanged sections (1 mark)
- b) Discuss limit state method of design (9 marks)
- c) Explain the following terms (4 marks)
 i) Braced and Unbraced Column
 ii) Short and slender Column
- d) Determine if the braced column shown in Figure Q5 is short or slender. Given: $h = 400\text{mm}$; $b = 200\text{mm}$; $S_r = 150\text{mm}$ and $B_r = 400\text{mm}$. For end condition 1 of Table 3.19 (BS 8110 – 1997) $\beta = 0.75$ (10 marks)

Question 6 (25 marks)

Design the bending and shear reinforcements of a simply supported beam with span $L = 6\text{ m}$; having the following parameters: width $b = 250\text{ mm}$; overall depth $h = 800\text{ mm}$; concrete cover $c = 80\text{ mm}$; assumed reinforcement diameter = 32 mm and $d^1 = 60\text{ mm}$; the beam support the following uniformly distributed loads; Partition = 82.78 kN/m , Finishes = 10 kN/m , self – weight, and imposed load $q_k = 40\text{ kN/m}$. The characteristics material strengths are $f_{cu} = 40\text{ kN/mm}$ and $f_y = 460\text{ kN/mm}$, $f_{yv} = 250\text{ kN/mm}$. (25 marks)

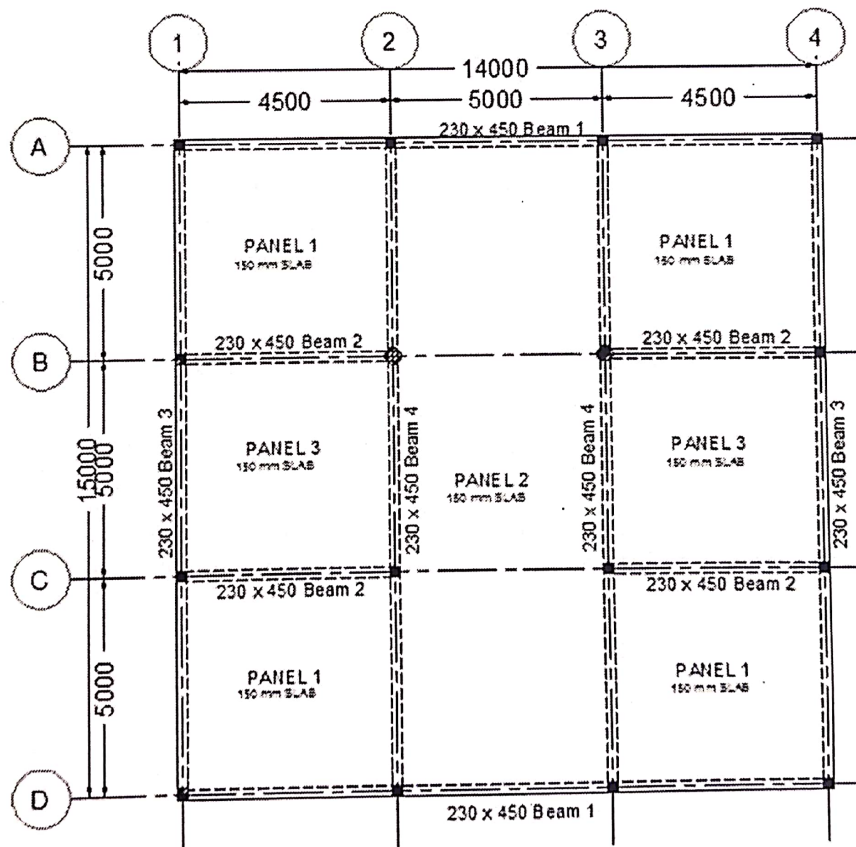


FIGURE Q3: STRUCTURAL LAYOUT

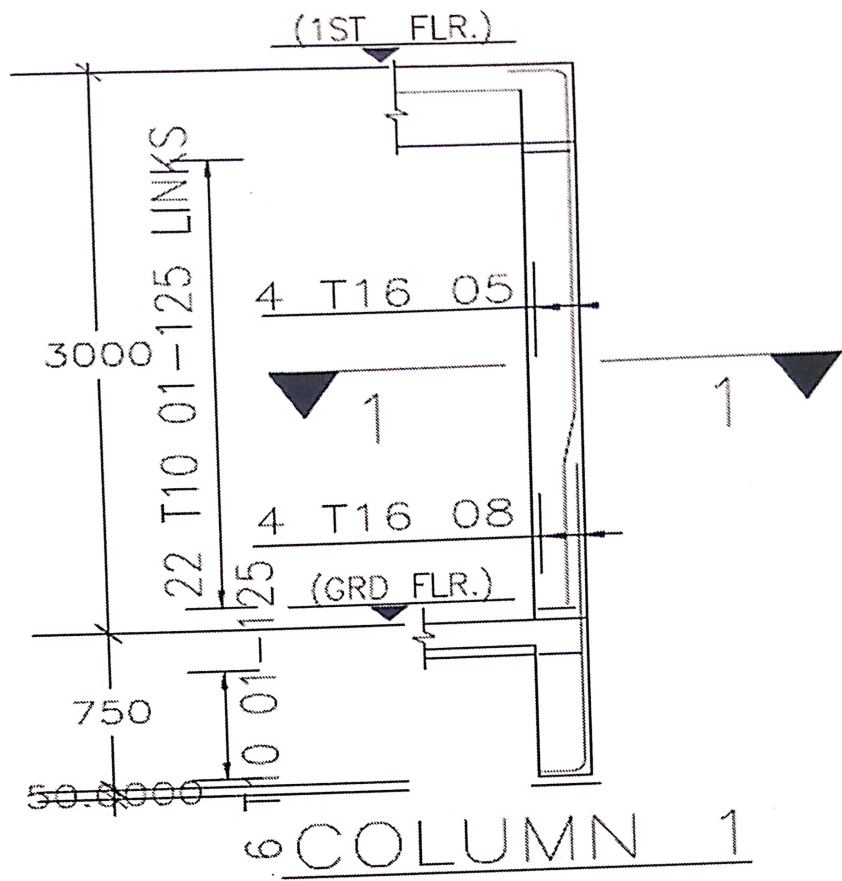


Figure Q4: COLUMN