



**FACULTY: ENGINEERING**  
**SECOND SEMESTER EXAMINATIONS (JULY 2017)**  
**2016/2017 ACADEMIC SESSION**

HOD'S SIGNATURE

**COURSE CODE: CVE 308**  
**COURSE TITLE: DESIGN OF STRUCTURES I**  
**DURATION: 2.5 Hours**

**INSTRUCTIONS:**

- 1. YOU ARE TO ANSWER ANY FOUR QUESTIONS**
- 2. SEVERE PENALTIES APPLY FOR MISCONDUCT, CHEATING, POSSESSION OF UNAUTHORIZED MATERIALS DURING EXAMINATION**
- 3. YOU ARE NOT ALLOWED TO BORROW CALCULATORS AND ANY OTHER WRITING MATERIALS**
- 4. BS 8110 PARTS I & III ARE ALLOWED IN THE EXAMINATION**

**ELIZADE UNIVERSITY, ILARA-MOKIN**  
**FACULTY OF ENGINEERING**  
**DEPARTMENT OF CIVIL AND ENVIRONMENTAL ENGINEERING**  
**SECOND SEMESTER 2016/2017 EXAMINATIONS**  
**CVE 308: DESIGN OF STRUCTURE I**

**Instructions:** Attempt ANY FOUR questions.

**Candidate's Name:**

**Mat. No**

**Time : Allowed: 2.5hrs.**

**QUESTION 1 (15 marks)**

- a) What is the aim of structural design? (3 marks)
- b) Enumerate the three stages of design process. (3 marks)
- c) What is characteristic strength? (3 marks)
- d) What is design strength? (3 marks)
- e) Enumerate factors that may reduce the strength of concrete in a structure. (3 marks)

**QUESTION 2 (15 marks)**

- a) Discuss, limit state method of design. (5 marks)
- b) Determine if the braced column shown in Figure Q2 is short or slender. Given:  $l_{ox} = 3.4\text{m}$ ;  $h = 300\text{mm}$ ;  $b = 200\text{mm}$ ;  $S_t = 200\text{mm}$  and  $B_t = 400\text{mm}$ . (10 marks)

**QUESTION 3 (15 marks)**

- a) State the aim of structural design. (5 marks)
- b) Design the longitudinal reinforcement for a 400mm by 220mm column section if:
  - i.  $N = 1500\text{kN}$  and  $M_x = 200\text{kNm}$ ; Assume 25mm diameter bars and 27.5mm cover
  - ii.  $N = 1500\text{kN}$  and  $M_y = 80\text{kNm}$ ; Assume 25mm diameter bars and 20.5mm cover. Where  $M_x$  is the bending moment about the major axis and  $M_y$  is the bending moment about the minor axis. Given:  $f_{cu} = 40\text{N/mm}^2$  and  $f_y = 460\text{N/mm}^2$ . (10 marks)

**QUESTION 4 (15 marks)**

Design panel P1 in Figure Q4 for tension reinforcement and check for deflection. Given: Usage of building – gymnasium; slab thickness – 150 mm; Finishes – 1.0 kN/m<sup>2</sup>; partition load – 1.5 kN/m<sup>2</sup>;  $f_{cu} = 25 \text{ N/mm}^2$ ;  $f_y = 460 \text{ N/mm}^2$ ;  $L_1 = 6\text{m}$ ;  $L_2 = 4\text{m}$ ; cover – 20mm; diameter of reinforcement – 12 mm.

**QUESTION 5 (15 marks)**

A 150mm thick slab whose center to center distance of the supports is 4 m is to be designed to carry a live load  $Q_k$  of 2.5 kN/m<sup>2</sup> plus floor finishes and ceiling load of 1.0 kN/m<sup>2</sup>. The characteristic material strengths are  $f_{cu} = 25\text{N/mm}^2$  and  $f_y = 460 \text{ N/mm}^2$ . Design for the main and transverse reinforcements and, check for deflection.

**QUESTION 6 (15 marks)**

The beam is 200 mm wide by 450 mm deep with three equal 4m spans. In the transverse direction, the beams are at 3.0m centers with a 150mm thick slab. The live load  $q_k$  on the beam is 30kN/m and the dead load  $g_k$  including self-weight is 45kN/m. Characteristics material strengths are  $f_{cu} = 25\text{N/mm}^2$ ,  $f_y = 460\text{N/mm}^2$  for the longitudinal steel and  $f_{yv} = 250\text{N/mm}^2$  for the links. For a mild exposure the minimum concrete cover is to be 25 mm, diameter of longitudinal to be used is 25mm and, diameter of shear reinforcement to be used is 10mm. Design for:

- a. Bending reinforcement for the first span and first interior support. (7 marks)
- b. Check for deflection. (8 marks)

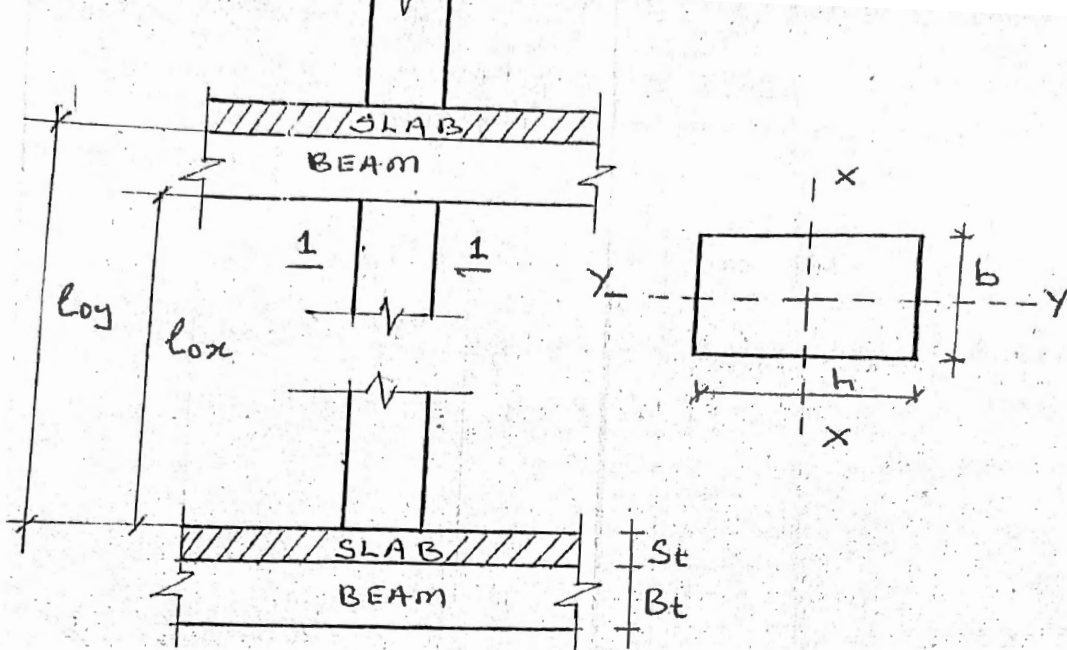


Figure Q2: Short braced column

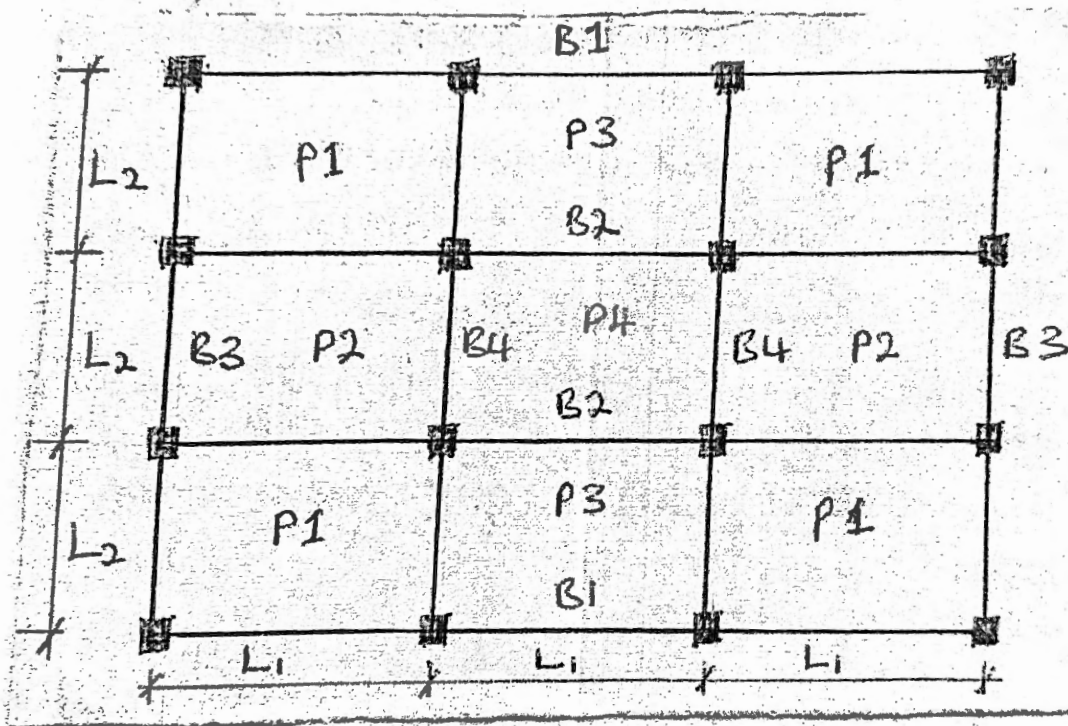


Figure Q4: Plan view of gymnasium building