JARAMOGI OGINGA ODINGA UNIVERSITY OF SCIENCE AND TECHNOLOGY

SCHOOL OF ENGINEERING AND TECHNOLOGY

UNIVERSITY EXAMIMATION FOR THE DEGREE IN SCIENCE IN CONSTRUCTION MANAGEMENT

3rd YEAR 1st SEMESTER 2024/2025 ACADEMIC YEAR

CENTRE: MAIN CAMPUS

COURSE CODE: TCB 1301

COURSE TITLE: STRUCTURES II

EXAM VENUE: STREAM: BSc. CONSTRUCTION MGT

DATE:6/1/25 EXAM SESSION:9-11.00 AM

DURATION: 2 HOURS

Instructions

1. **Answer question 1 (Compulsory) and ANY other two questions**
2. **Candidates are advised not to write on question paper**
3. **Candidates must hand in their answer booklets to the invigilator while in the examination room.**

QUESTION ONE (30 Marks)

a. Which are the four (4) processes used to determine the value of actions for analysis? (4 Marks).

b. There are a number of differences between Eurocode 2 and BS 8110, which will initially make the new Eurocode seem unfamiliar. List six (6) key differences? (6 Marks).

c. List at least six (6) benefits of using Eurocode 2? (6 Marks).

d. Eurocode 2, Part 1–1 allows any of the three (3) sets of load arrangements to be used for both the ultimate limit state and serviceability limit state. Describe these using sketches? (6 Marks).

e. The ultimate limit states are divided into four (4) different categories. Name them? (8 Marks).

QUESTION TWO (20 Marks)

A rectangular reinforced concrete slab is simply supported on two masonry walls 250mm thick and 3.0m apart. The slab has to carry a distributed permanent action of 0.8kN/m^2 (excluding slab self-weight) and a variable action of 2.0kN/m^2. The materials to be used are grade C25 concrete and grade 500 reinforcement. The slab is outside buildings which subjected to 1hr fire resistance and design for 50years design life. Assume diameter of bar = 12mm. Min. cover with regard to durability, $C_{min,dur}$ = 20 mm

a. Estimate thickness of concrete slab considering deflection control? (3 Marks).

b. Check for Durability, Fire & Bond Requirements, then determine the nominal cover, C_{nom}? (3 Marks

c. Determine the Design action, n_d? (3 Marks).

d. Determine shear force and bending moment? (4 Marks).

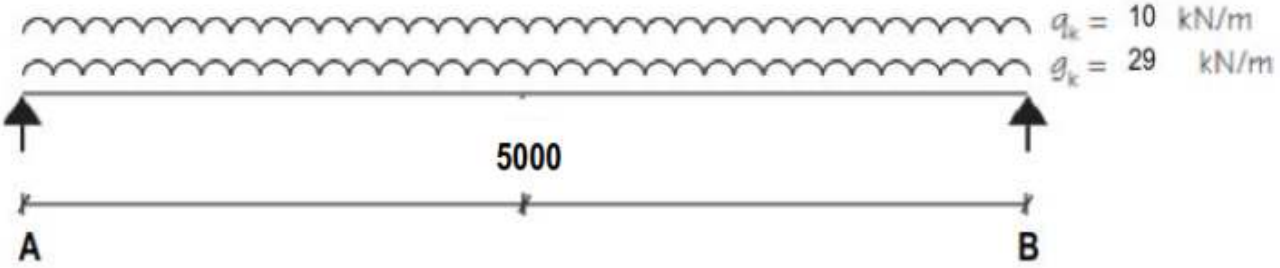
e. Determine the main and distribution reinforcement? (3 Marks).

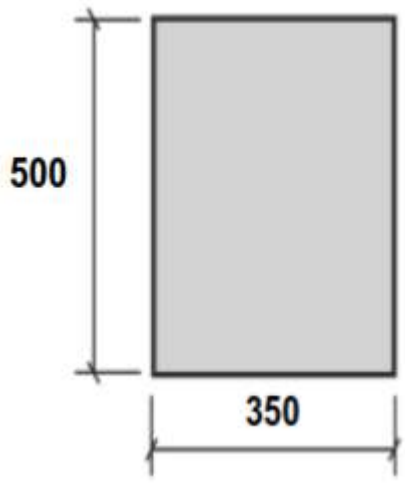
f. Check for shear? (2 Marks).

g. Check for deflection? (2 Marks)

QUESTION THREE (20 Marks)

A 500 mm deep × 350 mm wide simply supported rectangular beam is required to support office loads of g_k = 29 kN/m and q_k = 10 kN/m 5 m span. f_{ck} = 30 MPa, f_{yk} = 500 MPa. Assume 300 mm wide supports, a 50-year design life and a requirement for a 2-hour resistance to fire in an external but sheltered environment. Assume diameter of bar = 25mm.

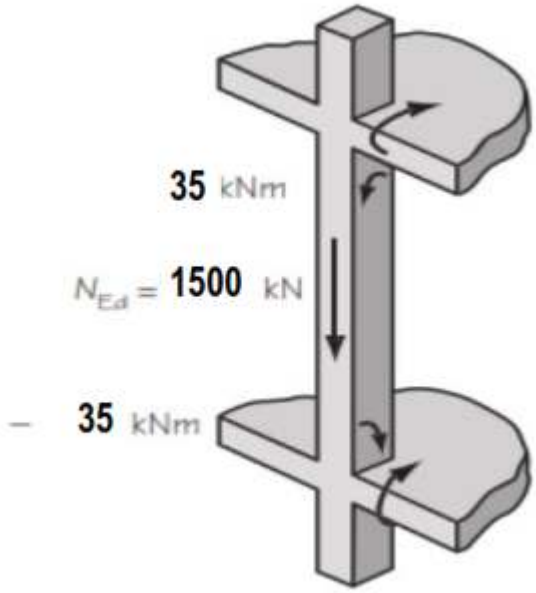




a. Check for Durability, Fire & Bond Requirements, then determine the nominal cover, C_{nom}? (3 Marks).
b. Determine the Design action, n_d? (3 Marks).
c. Determine the Design Moments and Shear force? (3 Marks).
d. Design for flexure in span and supports? (3 Marks).
e. Check for deflection? (3 Marks).
f. Design for Shear at the supports? (3 Marks).
g. Present a schematic design summary? (2 Marks).

QUESTION FOUR (20 Marks)

A 350 mm square column on the edge of a flat slab structure supports an axial load of 1500 kN and first order moments of 35 kNm top and −35 kNm bottom in one direction only. The concrete is grade C30/37, f_{ek} = 30 MPa and cover, c_{nom}, = 25 mm. The 200 mm thick flat slabs are at 3500 mm vertical centres.



Forces in edge column

a. Check for slenderness? (4 Marks).
b. Design maximum moments? (4 Marks).
c. Design using charts? (4 Marks).
d. Design for links? (4 Marks).
e. Present a schematic design summary? (4 Marks).

END