



# UNIVERSITY OF RUHUNA

Faculty of Engineering

Mid-Semester 5 Examination in Engineering: June 2014

Module Number: CE5217

Module Name: Structural Analysis III

[Two Hours]

[Answer all questions. Each question carries 10 marks]

All Standard Notations denote their regular meanings

- Q1. a) What is yield line pattern? [1 mark]
- b) Briefly explain necessity of the yield line analysis. [2 marks]
- c) Explain "Behavior of slabs near collapse" of simply supported square concrete slab subjected to a uniformly distributed load? Use sketches to illustrate your answer. [3 marks]
- d) Discuss the difference between positive yield line and negative yield line. [1 mark]
- e) Draw the possible yield line patterns and axis of rotation for the slabs shown in Figures Q1(a), Q1(b) and Q1(c) (drawn according to conventional notations). [3 marks]
- Q2. a) What is the virtual work equation for yield line theory? Clearly define the parameter in the equation. [1.5 marks]
- b) An isotropically reinforced rectangular slab shown in Figure Q2 is simply supported on three edges and free at the remaining edge. The slab carries a uniformly distributed load of intensity  $p$  (per unit area).
1. Draw two possible yield line patterns at collapse.
  2. Determine the collapse load corresponding to above yield line patterns.
  3. Determine ultimate uniformly distributed load that can be carried by the slab.
- [8.5 marks]

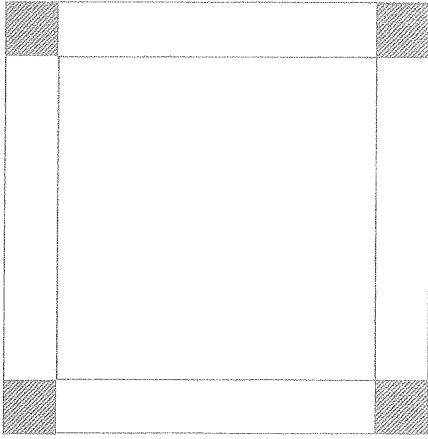


Figure Q1(a)



Figure Q1(b)

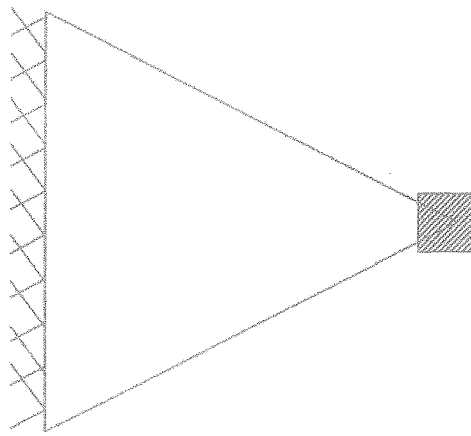


Figure Q1(c)

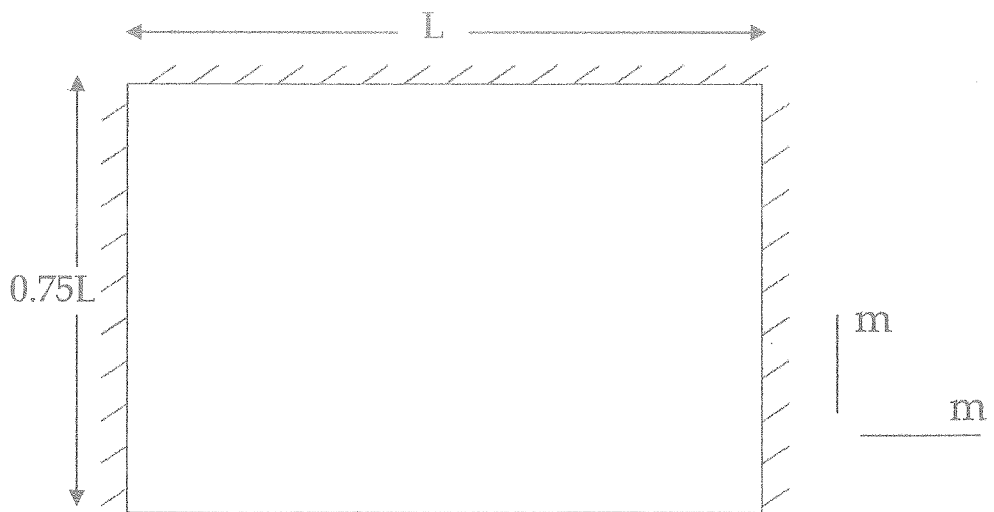


Figure Q2