# UNIVERSITY OF RUHUNA

## Faculty of Engineering

Mid-Semester 5 Examination in Engineering: June 2015 (Old curriculum, Repeat)

**Module Number: CE 5217**          **Module Name: Structural Analysis III**

**[Two Hours]**

**[Answer all questions]**

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Q1  a)  What is a yield line?

[2 Marks]

b)  Explain "near collapse behavior." of a reinforced concrete square slab subjected to a uniformly distributed load. Use sketches to illustrate your answer.

[3 Marks]

Q2  a)  What are the guidelines that can be used to establish a yield line pattern?

[2 Marks]

b)  Draw all possible yield line patterns and axis of rotation for the slab shown in Figures Q2(a) and Q2(b) (*drawn according to conventional notations*).

[3 Marks]

Q3  c)  What is the virtual work equation for yield line theory? Clearly define the parameters in the equation.

[2 Marks]

b)  An orthotropically reinforced rectangular slab shown in Figure Q3 is simply supported on three edges and free at the remaining edge. The slab carries a uniformly distributed load of intensity $q$ (per unit area). The yield moment per unit length of yield lines in the direction of the reinforcement is shown in Figure Q3. Determine the collapse load corresponding to the yield line pattern shown in the Figure Q3, in terms of $m$, $a$, $\mu$ and $L$.
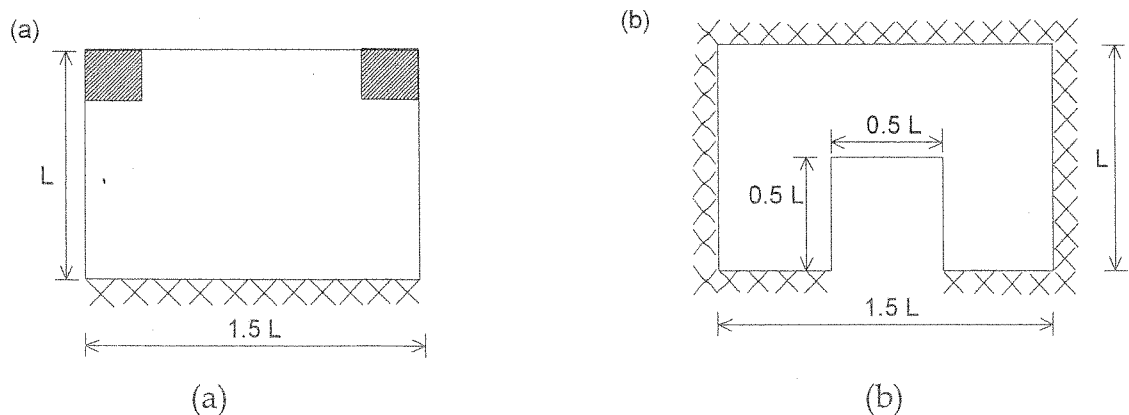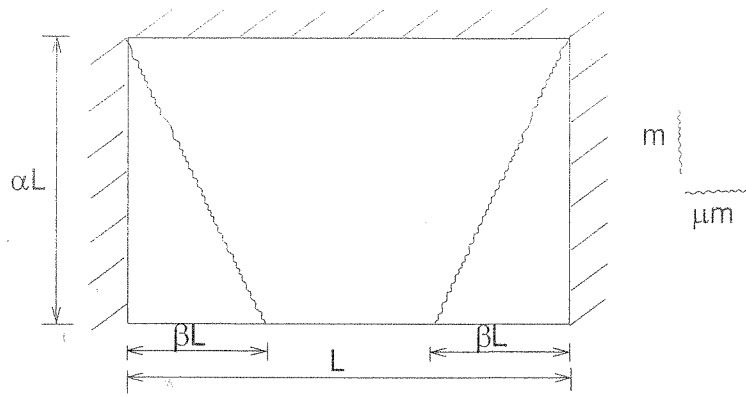
[8 Marks]

(a)

(b)



(a)                                                  (b)

Figure Q2

Figure Q3