



# TECHNICAL UNIVERSITY OF MOMBASA

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FACULTY OF ENGINEERING AND TECHNOLOGY

DEPARTMENT OF ARCHITECTURE & BUILT ENVIRONMENT

**UNIVERSITY EXAMINATION FOR:**

**DIPLOMA OF QUANTITY SURVEYING**

**EQS 2104: MEASUREMENTS I**

**SPECIAL/SUPPLEMENTARY EXAMINATION**

**SERIES: SEPTEMBER 2018**

**TIME: 2 HOURS**

**DATE:** Pick Date Sep 2018

## **Instructions to Candidates**

You should have the following for this examination

-Answer Booklet, examination pass and student ID

This paper consists of **FIVE** questions. Attempt question ONE (Compulsory) and any other TWO questions.

**Do not write on the question paper.**

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You are a Quantity Surveyor assistant working in a Quantity Surveying firm and you find a set of architectural drawing and scanty structural information on your working station. On studying the drawings, you establish that it is a proposed two-storeyed block of three-bedroomed flats with structural system consisting of reinforced concrete strip and pad foundations, columns, beams, staircases and slabs; and non-load bearing walling in machine-cut coral blocks under all beams. The rectangular plinth floor area is 24400mm long and 8600mm wide. The overall storey height is 3000mm high each; and staircase well terminates at 2550mm height excluding the 400mm parapet walling. The main parapet walling is 900mm high.

Assuming there are 30 No. 300mm x 200mm columns (reinforced in 4 No. 16mm diameter deformed steel bars, and 8mm diameter links at 150mm centres) on 1200mm x 1200mm x 200mm identical pad foundations (reinforced in 12mm diameter deformed steel bars @ 175mm centres, both ways) and they are in three rows of 10 No. Columns each; and the strip foundation (600mm x 200mm is reinforced in 3 No. 8mm diameter bars running longitudinally and 10mm diameter bars in binders @ 150mm centres transversely) linking all the column bases in the foundation layout; and is further stated that the depth of excavation is at 1200mm below the existing ground level, and the top of the floor slab at 300mm above the existing ground level:

**Question One:**

Showing all your workings and stating all further assumptions, prepare the Bills of Quantities for all the substructure works. (30 marks)

**Question Two:**

Given that all the beams (reinforced with 4No. 16mm diameter deformed steel bars, 2No. 12mm diameter deformed steel bars, and 8mm links @ 200mm centres) are running over all columns and assuming  $85\text{kgm}^{-3}$  of steel for the horizontal suspended slabs, prepare the Bills of Quantities for the concrete superstructure works excluding the staircase and staircase well above first floor. Show all your workings and state all further assumptions. (15 marks)

**Question Three:**

Given the staircase, located at the centre of the proposed building, is of reinforced concrete and accesses the roof top and that the staircase well is also roofed at 2550mm level above the main roof, prepare the Bills of Quantities for the staircase and the staircase well works. Make the following assumptions: 12mm diameter main deformed steel bars @200mm centres, and 8mm diameter deformed steel bars in binders for the staircase,  $85\text{kgm}^{-3}$  of steel for the horizontal suspended slab over the staircase well, 150mm high risers, 250mm wide treads, 150mm thick waist and landings, and the staircase well is 2400mm x 4650mm internally. Show all your workings and state all further assumptions. (15 marks)

**Question Four:**

Assuming there are 2No. three-bedroomed units per floor in the proposed building; and 1200mm x 2400mm opening for main entrance door (1No.) on the ground floor and that each unit has the following openings: 900mm x 2400mm openings for doors (9No.), 1500mm x 1500mm openings for larger windows (9No.); 1500mm x 1200mm opening for kitchen window; 600mm x 600mm openings for smaller windows (2No.); and 2000mm x 1050mm for vents (3No. for the whole building) at the staircase well. While showing all your workings, prepare the Bills of Quantities for all the walling works including coping (where applicable) floor by floor, including the staircase well assuming there is walling under all beams and none elsewhere. (15 marks)

**Question Five:**

- a) What is meant by the following terminologies in Quantity Surveying: Bills of Quantities, Standard Method of Measurement and extra-over items. (3 marks)
- b) State and explain measurement principles. (12 marks)