THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

HIGHER DIPLOMA BUILDING CONSTRUCTION
(HDBC 09)

DESIGN OF STRUCTURES

END OF SEMESTER EXAMINATION

SERIES: APRIL/MAY 2010

TIME: 3 HOURS

Instructions to Candidates:

You should have the following for this examination:
- Answer Booklet

This paper consists of **TWO** sections **A** and **B**.

Answer question **ONE** in Section **A** and choose **TWO** questions in Section **B**.

Maximum marks for part of question are as shown.

SECTION A: MODEL SOLUTIONS

Q.1 The floor of a hall 7.0m by 12.0m is supported on r.c beams equally spaced at 3.0m centres. The slab is monolithically casted with the supporting beams. Design fully a typical internal T-beam. (30 marks)

Data:

- Concrete mix 1:2:4
- High Yield steel
- Load factor method o f design
- P.V.C tiles of weight = 0.35 Kg/m^2
- Upper screed = 20mm
- Lower screed = 15mm
- Density of screed = 18 KN/m^3
- Density of concrete = 24 KN/m^3

SECTION B

(Answer any **TWO** questions from this Section.)

Q.2 A r.c column 250m x 250m is required to carry a axial load of 500 KN. The column has an actual length of 4.0m and is fully fixed at top and bottom.
Design:

(a) The column
(b) A square base for the column for bending requirements. (20 marks)

Data:

- Bearing capacity of soil is 230 KN/m^2
- Mix 1:2:4
- High Yield Steel
- Load factor method.

Q.3 A load bearing wall 200m thick transmits an axial load of 350 KN/m on to a strip footing. Design the footing and show the arrangement of reinforcement. (20 marks)

Data:

- Concrete mix 1:2:4
- High Yield Steel
- Local factor method
- Bearing capacity of soil = 250KN/m^2

Q.4 (a) State **FOUR** loses of pre-stress. (4 marks)

(b) Figure 3 shows a pre-stressed concrete beam.

(i) Determine the pre-stressing force if the combined stresses at top and bottom is limited to -2N/m^2 and 26 N/m^2 respectively.

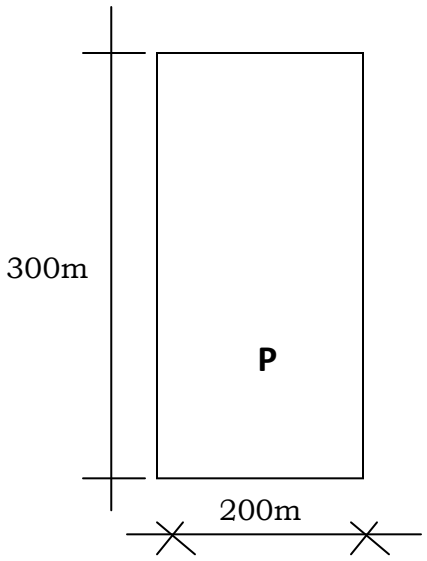

Fig.3

(ii) Determine the safe uniformly distributed load the beam would carry over a span of 8.0m allowing 20% loss of pre-stress.

(16 marks)

Q.5 Figure 4 shows a concrete retaining wall containing a non-cohesive soil. Determine the stability of the wall for:

(a) Overturning

(b) Sliding

(c) Tension cracks

(d) Bearing

Data:

- Density of soil in 18 KN/m^3
- Density of concrete = 24 KN/m^3
- Ø = 30°
- μ = 0.3

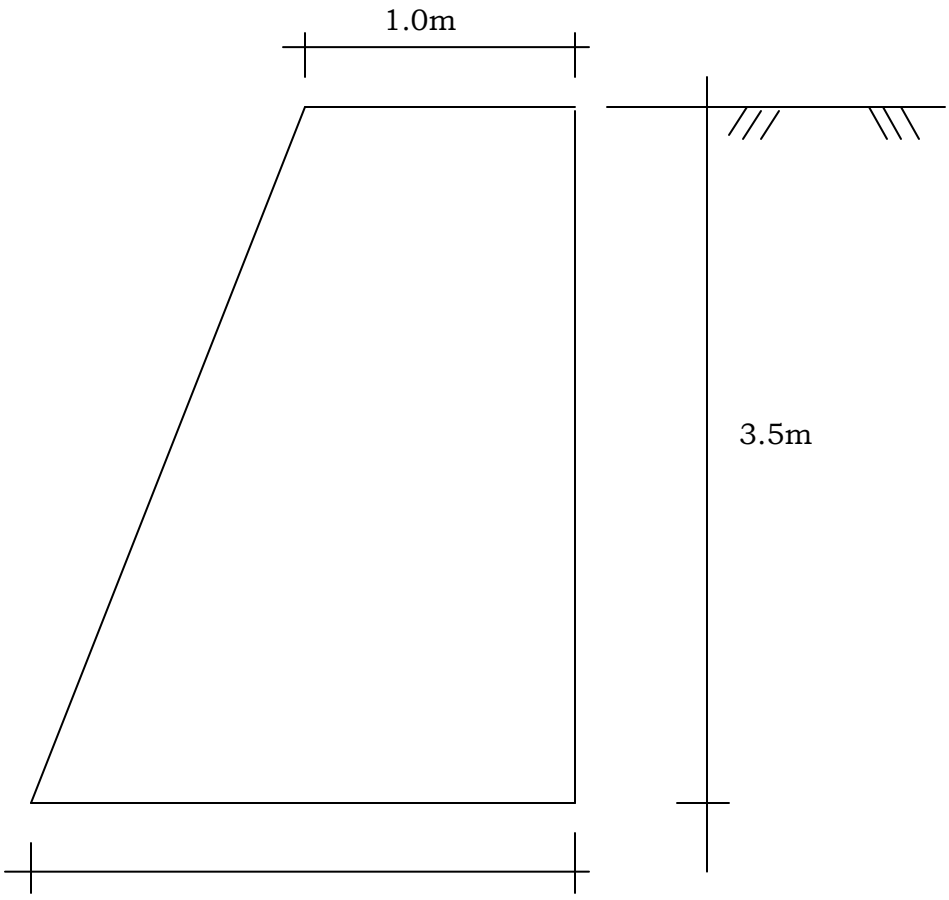

Fig.4