



THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering & Technology

DEPARTMENT OF CIVIL AND BUILDING ENGINEERING

**HIGHER DIPLOMA IN BUILDING AND CIVIL ENGINEERING
(HD 08A)**

**CONSTRUCTION & BUILDING SERVICES TECHNOLOGY,
CONCRETE TECHNOLOGY AND CONSTRUCTION PLANT**

END OF COURSE EXAMINATIONS

APRIL/MAY 2010 SERIES

TIME: 2 HOURS

Instructions to Candidates

This paper consists of **THREE** Sections;

Section A: Construction and Building Services (Answer **TWO** Question)

Section B: Concrete and Timber Technology (Answer **TWO** Questions)

Section C: Construction Plant (Answer **ONE** Question)

* Answer each section on separate sheets of paper.

SECTION A : CONSTRUCTION TECHNOLOGY

Question ONE

- (a). When planning a site layout plan, the contractor must consider, amongst others, the following preliminary items:-
- (i). Access to the site
 - (ii). Access on the site
 - (iii). Site offices
 - (iv). Adjoining properties
 - (v). Security of the site
 - (vi). Storage of materials
 - (vii). Safety on site

State any **TWO** factors to be considered in any **THREE** of the above items. **(6 Marks)**

- (b). Briefly explain the following functional requirements of a building structure:-

- (i). Strength
- (ii). Stability **(6 Marks)**

- (c). With the aid of a sketch, outline the procedure for setting out column positions in a framed structure using a theodolite. **(8 Marks)**

Question TWO

- (a). (i). Briefly explain the concept of portal frame construction.
- (ii). State **TWO** advantages of using portal frames over simply supported beams. **(6 Marks)**

- (b). Briefly outline the concept of using bentonite slurry in the construction of a diaphragm wall in a deep basement. **(8 Marks)**

- (c). Briefly describe the following types of floor finishes:-
- (i). Terrazzo
 - (ii). Granolithic **(6 Marks)**

Question THREE

- (a). Translucent or transparent roofing sheets may be used for roofing industrial buildings so as to admit natural day light into the building:
- (i). Briefly explain the following phenomenon associated with the above construction:-
- Solar heat gain
 - Condensation
- (ii). Briefly explain **TWO** ways of reducing the above effects in a building. **(8 Marks)**
- (b). With the aid of a labeled sketch illustrate the indirect cold water supply system. **(6 Marks)**
- (c). (i). Briefly explain the **TWO** modes of sound transmission.
(ii). Define the term reverberation. **(6 Marks)**

SECTION B: CONCRETE AND TIMBER TECHNOLOGY

Question FOUR

Using D.O.E procedure, design a concrete trial mix, given the following data:

- Characteristic strength – 25N/mm^2 @28 days,
- Number of cubes to be cast – 30,
- %age defectives allowed – 5 ($k=1.64$),
- Aggregates:
 - o Coarse - Crushed, nominal size – 20mm
 - o Fine - River sand, Grading zone – 3
- Cement
 - o Type – ordinary Portland,
 - o Max. Content – 550kg/m^3
 - o Min. content – 300kg/m^3
- Water/cement ratio – 0.6 (max.),
- Workability level – 30 – 60mm slump,
- Design tables and charts are attached.

(20 Marks)

Question FIVE

- (a). Outline the manufacturing process of Portland cement.
- (b). Describe the following types of Portland cement:
- (i). Rapid hardening
- (ii). Extra rapid hardening
- (iii). Sulphate resisting

- (c). Briefly, outline the crushing value test of aggregates. **(8 Marks)**
(4 Marks)
- (d). For each of the admixtures listed below, state any **TWO** reasons that would necessitate its use:
- (i). Accelerator
 - (ii). Retarder
- (4 Marks)**

Question SIX

- (a). Concisely, explain how internal vibration of concrete should be carried out. **(4 Marks)**
- (b). Explain any **TWO** methods of achieving exposed aggregate finish of concrete. **(4 Marks)**
- (c). State the requirements of timber formwork. **(4 Marks)**
- (d). Explain the structural reasons that lead to use of reinforcing steel in the following concrete: Structural elements:
- (i). Beams,
 - (ii). Columns
- (8 Marks)**

SECTION C - CONSTRUCTION PLANT

Question SEVEN

- (a). State the factors considered in choosing pile driving equipment. **(6 Marks)**
- (b). With the aid of a sketch describe the procedure of driving raked pile using a drop hammer. **(7 Marks)**
- (c). Sketch and label the following cutting bits.
- (i). Shell
 - (ii). Continuous flight auger
- (7 Marks)**

Question EIGHT

- (a). State **FIVE** uses of pumps in construction. **(2½ Marks)**
- (b). Using a sketch, describe the operation of the following pumps:
- (i). Semi - rotary **(7½ Marks)**
- (c). (i). Using line diagram show the procedure of blasting.
(ii). State the precautions taken when blasting. **(10 Marks)**