THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

Faculty of Engineering

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

DIPLOMA IN CIVIL ENGINEERING

MEASUREMENT, ESTIMATING AND COSTING

END OF SEMESTER I EXAMINATION

SERIES: APRIL/MAY 2010

TIME: 3 HOURS

Instructions to Candidates:

You should have the following for this examination:
- Answer Booklet
- Pocket Calculator
- Dimension papers
- A copy of the Standard Method of Measurement of Building Works (SMM)
- A copy of the Civil Engineering Standard Method of Measurement (CESMM)

This paper consists of **SIX** questions in **TWO** sections **A** and **B**.

Answer any **TWO** questions from each Section.

Question in Section **A** carry 30 marks each while those in Section **B** carry 20 marks each.

Maximum marks for part of question are as shown.

SECTION A: MEASUREMENT
(Answer any **TWO** questions from this section.)

Q.1 Take off **all** quantities for the Substructure works for Fish Pond shown in
drawing No.01.   (30 marks)

Q.2 A cutting is to be excavated for a road 360M in length and 20M in width,
to an even gradient with mean depths calculated at 60M intervals as
indicated below and side slopes 2 to 1. Prepare a table for the cutting and
take off quantities for the excavations. **(use CESMM).**

CROSS SECTION	1	2	3	4	5	6	7
MEAN DEPTH (M)	4	9	15	18	16	14	8

Q.3 (a) With suitable illustrations, explain how the following are used in the
Traditional method of Bill of Quantities preparation.

   - Grouping of dimensions
   - Grouping of descriptions
   - Dotting-on
   - Ditto.   (12 marks)

(b) Give **SIX** purposes of a Bill Quantities with a brief explanation of
each.   (18 marks)

SECTION B: ESTIMATING AND COSTING
(Answer any **TWO** questions from this Section)

**Use the information in Appendix 'A' for price build-up. Assume any other
necessary information.**

Q.4 (a) List the **FIVE** main factors to be considered in the build-up of a
unit rate.   (12 marks)

(b) Explain the following terms as used in Estimating and Costing:-

   - All-in-labour rate.
   - Owning and operating costs for Plant.   (8 marks)

Q.5 Build up unit rates for the following items:-

(a) Excavate foundation trench not exceeding 1.50m deep. [CM]   (10 marks)

(b) Mass concrete 1:3:6 in strip foundations. (CM)   (10 marks)

Q.6   (a)   Build up the hourly rate of owning and operating a 200 liter capacity
              concrete mixer using the following information:-

              • Purchase of new mixer   Kshs.1,600,000.00
              • Salvage value after six (6) years   Kshs.185,000.00
              • Cost of transport per year   Kshs.40,000.00
              • Interest and Insurance per year   30% of annual depreciation
              • Maintenance and repairs per year   20% of annual depreciation
              • Annual working time   2000 hours
                Fuel per 8 hour working day   Kshs.2,400,006.   (16 marks)

       (b)   If the concrete mixer in question 2(a) above has a time cycle of
              5 minutes, calculate its output.   (4 marks)

DATA FOR USE IN ESTIMATING AND COSTING

All-in Skilled labour rate per hour	sh.90.00
All-in unskilled labour rate per hour	sh.80.00

Labour constants:

Excavate top soil average 150mm deep per SM	0.35 hrs
Excavate to reduce levels average 150mm deep per SM	0.45 hrs
Excavate to reduce levels average 200mm deep per CM	2.40 hrs
Excavate foundation trench not exceeding 1.50m deep per CM	3.25 hrs
Excavate foundation trench exceeding 1.50m but not exceeding 3.00m deep per CM.	6.50 hrs
Excavate pit for isolated base not exceeding 1.50m deep per CM	5.00 hrs
Excavate pit for isolated base exceeding 1.50m but not exceeding 3.00m deep per CM	10.00 hrs
Offloading cement in 50 Kg. bags per ton	1.50 hrs
Mixing, transporting, placing and compacting concrete in foundation trenches not exceeding 150mm thick per CM	4.66 hrs
Mixing, transporting, placing and compacting concrete in foundation trenches 150-300mm thick per CM	4.33 hrs

Materials:

Cement in 50 Kg. bags delivered to site	sh.700.00
Fine aggregate (sand) per ton delivered to site	sh.800.00
Ballast per ton delivered to site	sh.1,800.00
Density of Cement	1442 Kg.
Density of Sand	1600 Kg.
Density of Ballast	1550 Kg.
Waste on concrete materials	10%
Shrinkage and voids in concrete	40%
Overheads and Profit	20%