



# THE MOMBASA POLYTECHNIC UNIVERSITY COLLEGE

(A Constituent College of Jkuat)

*Faculty of Engineering and Technology*

DEPARTMENT OF BUILDING AND CIVIL ENGINEERING

**DIPLOMA IN CIVIL ENGINEERING (DC 09)**

EBC 2322 : MEASUREMENT, ESTIMATING & COSTING OF CIVIL  
ENGINEERING WORKS

**END OF SEMESTER EXAMINATION**

SERIES: AUGUST/SEPTEMBER 2011

**TIME: 3 HOURS**

**Instructions to Candidates:**

You should have the following for this examination

- *Answer booklet*
- *Dimension papers*
- *Pocket Calculator*
- *A copy of the Civil Engineering Standard Method of Measurement*

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

Answer **TWO** questions from each section

Questions in Section A carry 30 marks while those in section B carry 20 marks each

Maximum marks for each part of a Question are as shown

This paper consists of **THREE** printed pages

## **SECTION A - MEASUREMENT**

### **Question 1**

Take off all quantities for the Quay Works shown in drawing no C 01 (Use CESMM) (30 marks)

### **Question 2**

- a) State **TWO** classes of method related charges and list **TWO** items in each class differentiating between fixed and time-related charges. (10 marks)
- b) List and give brief explanation of **FIVE** items of Excavation Ancillaries (10 marks)
- c) List and give brief explanation of **FIVE** items of Concrete Ancillaries (10 marks)

### **Question 3**

A cutting is to be excavated for a road 360m in length and a width formation of 20m, 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 using Simpsons Rule take off all quantities for the excavations  
Use CESMM (30 marks)

CROSS SECTION	1	2	3	4	5	6	7
MEAN DEPTH (m)	5	12	9	10	14	18	8

## **SECTION B (Answer any TWO questions)**

Use the data in Appendix 'A' in addition to the information given in the question for price build-up. Assume any other necessary information.

### **Question 4**

- a) Differentiate between "overheads" and "profit" (4 marks)
- b) List **FIVE** constituents of overheads (5 marks)
- c) Mention and briefly explain **THREE** elements to be considered in the buildup of a unit rate (6 marks)
- d) Indicate and briefly explain **FIVE** sources of waste of materials during construction and what steps are necessary to be taken to minimize such waste (5 marks)

### **Question 5**

- a) Build up the hourly rate of owning and operating a Backhoe excavator using the following information: (20 marks)

- Purchase of new Backhoe excavator	kshs. 7,800,000.00
- Economic working life of Backhoe	6 years
- Salvage value after Economic working life	Kshs. 950,000.00
- Working hours per year	2000 hours
- Working hours per week	40 hours
- Haulage cost to and from site per year	ksh 400,000.00
- License per annum	kshs 21,000,000.00
- Interest and insurance per year	30% of annual depreciation
- General Maintenance and repairs per annum	30% of annual depreciation
- Fuel per 8 hour working day	kshs. 16,000.00
- Oil consumption of Backhoe per week	10 litres @ shs. 280 per litre

### Question 6

Build up a unit rate for the following:-

- a) Excavate Pit for column base over 1.50 but not exceeding 3.00m deep [CM] (5 marks)
- b) Reinforced concrete 1:2:4 mix in foundation trench (250 mm thick) [CM] (15 marks)

#### ADDITIONAL DATA FOR USE IN ESTIMATING AND COSTING

All-in-skilled labour rate per hour	shs. 110.00
All –in unskilled labour rate per hour	shs. 90.00
Plant operator per hour	shs. 100.00

#### Labour constants

Excavate pit for isolated base exceeding 1.50m but not exceeding 3.00 deep per CM	10.00 hours
Off-loading cement in 50kg. Bags per ton	1.50 hrs
Mixing, transporting, placing and compacting concrete in foundation trenches 150- 300m thick per CM	4.33 hrs

#### Costs in Materials

Cement in 50kg. Bags delivered to site	shs. 700.00
Fine aggregate (sand) per ton delivered to site	shs. 1,000.00
Ballast per ton delivered to site	shs. 2,100.00
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	45%
Overheads and profit	25%