

2307/305

MEASUREMENT, ESTIMATING
AND COSTING

Oct./Nov. 2009

Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN CIVIL ENGINEERING

MEASUREMENT, ESTIMATING AND COSTING

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination

Answer booklet

Dimension paper

Pocket Calculator

A copy of the Standard Method of Measurement of building works (SMM)

A copy of the Civil Engineering Standard Methods of Measurement (CESMM)

This paper consists of six questions in two section A and B.

Answer any two questions from each question.

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

Maximum marks for each part of a question are as shown.

This paper consists of 7 printed pages.

**Candidates should check the question paper to ascertain that
all the pages are printed as indicated and that no questions are missing.**

Answer any two questions from this section.

1. Take off all quantities for the substructure works shown on drawing No. 01 (use SMM).
(30 marks)
2. Take off all quantities for the external works shown on drawing No. 02 (use CESSM).
(30 marks)
3. (a) Outline **five** objectives of Bills of Quantities to the contracts.
(7½ marks)
- (b) Distinguish the following as used in contracts:
(i) "Defined works" from "undefined works".
(ii) "Periodic payments" from "stage payments".
(6 marks)
- (c) Briefly explain **three** reasons that necessitate 'Tender analysis exercise'.
(6 marks)
- (d) With suitable illustrations, explain how the following are used in the 'Traditional method' of Bill of Quantities preparation:
(i) grouping of dimensions;
(ii) grouping of descriptions;
(iii) casting up of the dimensions.
(10½ marks)

SECTION B: ESTIMATING AND COSTING

Answer any two questions from this section.

4. The Grand Coalition government is desirous of constructing new jetties in the cities of Mombasa and Kisumu next year. As the lead estimator for a contractor, briefly explain:
- (a) **six** factors which may affect the rates to be quoted for concrete works by your firm in the two projects; (12 marks)
 - (b) **four** factors to be considered when costing for formwork. (8 marks)
- USE DATA IN APPENDIX 'X' FOR PRICE BUILD UP.
5. Excavation ancillaries, disposal of excavated material, material other than top-soil, rock or artificial hard material per m³ (measured in accordance with CESMM). (20 marks)
6. Build up unit rates for:
- (a) 140 mm thick solid concrete block walling in cement and sand mortar (1:3), (per m²); (13 marks)
 - (b) 6 mm diameter mild steel reinforcement including cutting, bending and tying wire as necessary (per kg). (7 marks)

APPENDIX 'X'

I GENERAL INFORMATION

Skilled labour per day	sh 600
Unskilled labour per day	sh 350
Cost of materials include transport to site (assume any necessary information not given)	

II EXCAVATION ANCILLARIES (CESMM)

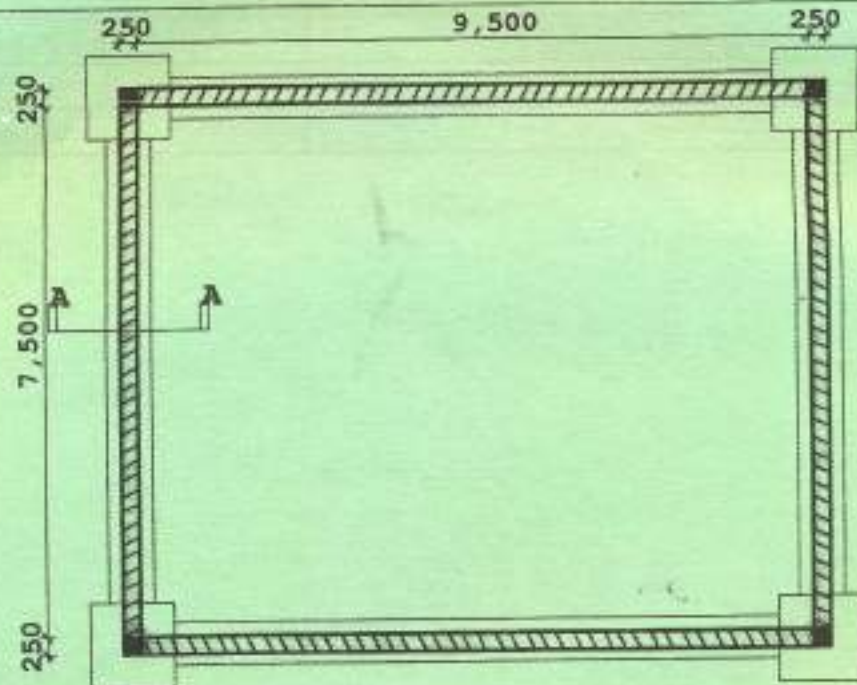
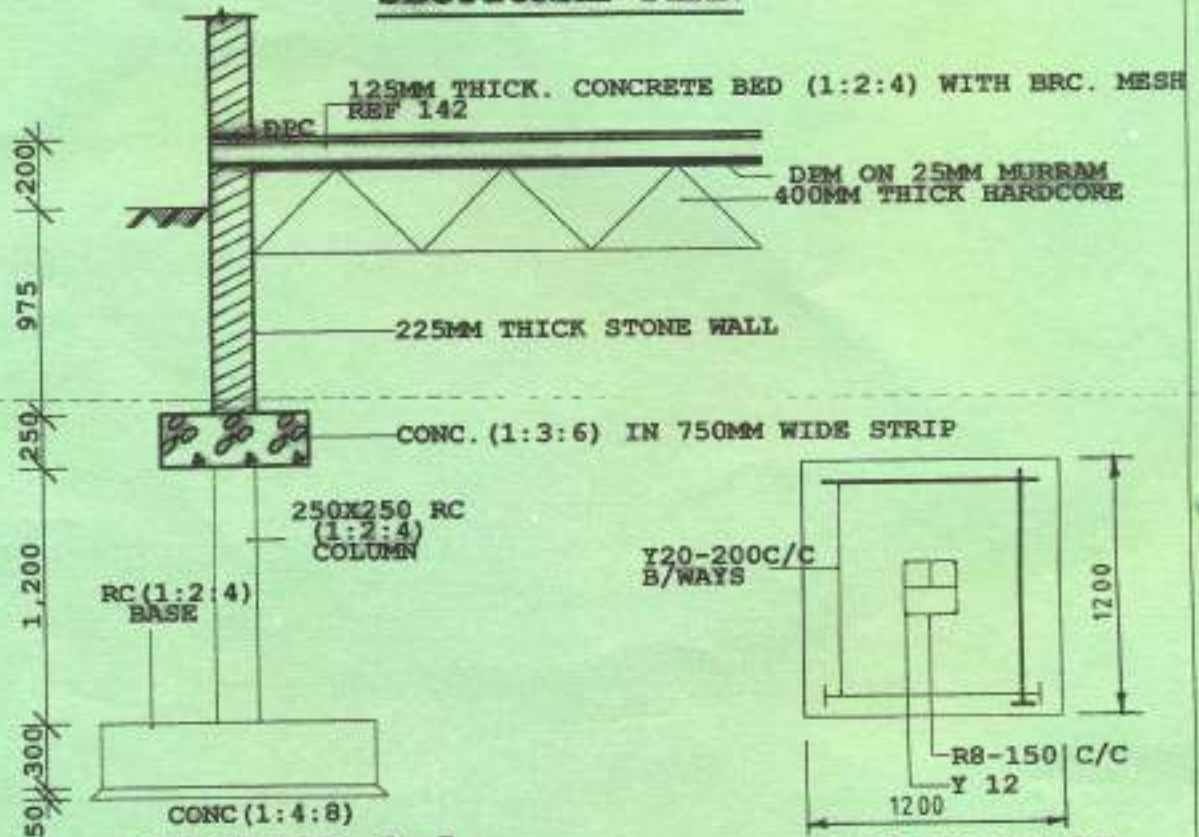
Purchase price of 7 tonne tipper lorry	sh 7,500,000
Economic working life of lorry	7 years
Working hours per annum	2100 hours
Scrap value of lorry	sh 750,000
Average interest per annum	16% of purchase price
Insurance per annum	4% of purchase price
Total for maintenance and repairs	20% of purchase price
Diesel consumption of lorry per week	360 litres @70 per litre
Lubricating oil per week	10 litres @220 per litre
Efficiency of lorry	80%
Haul distance	5km
Average empty haul of lorry	60 km/hr
Average loaded outward haul	40 km/hr
Tipping time	1 minute
Loading of lorry	20 minutes by 4 loaders
Tyres	Three set of six tyres @ sh 300,000 per set during the economic life working life
Haulage of tipper to and from site per annum	sh 30,000
Bulking of soil	20%
Working hours per week	45 hours
Loading cost per m ³	sh 300

III SOLID CONCRETE BLOCK

Size 390 x 140 x 190 blocks per each	sh 60
Cement per 50 kg bag	sh 750
Sand per tonne	sh 1300
Density of cement	1442 kg/m ³
Density of sand	1600 kg/m ³
Bulking of sand	25%
Mixing of mortar	Manual

IV REINFORCEMENT

6mm ϕ m.s. bar reinforcement	sh 175 per piece
Weight of 6 mm ϕ m.s. bar per m	0.222 kg
Tying wire per kg	sh 100

**SECTIONAL PLAN****SECTION A-A****PLAN BASE****NOTES:**

1. Site is bushy
2. Topsoil average 150mm deep for disposal
3. Rock commences at 1200mm below ground level

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PAPER NO

DRAWING NO. 1

1. Top soil grass planting and pcc slab for disposal
2. Conc pipe laid on mass conc bed and upvc laid directly on the ground.
3. Invent depth at MH1 MH2 and Cesspool are 0.75m, 2m and 2.4m and 2.4m respectively.
4. Wallings to Manholes to be of brickwork construction and rock occurs below ground level in MHS

DRAWING NO. 2
(EXTERNAL WORKS)