



**PROGRAM** : NATIONAL DIPLOMA  
CIVIL ENGINEERING

**SUBJECT** : **DOCUMENTATION III**

**CODE** : **DIS3111**

**DATE** : SUMMER EXAMINATION  
19 NOVEMBER 2019

**DURATION** : 3 hours

**WEIGHT** : 40 : 60

**TOTAL MARKS** : 105

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**EXAMINER** : Mrs N. REYECKE

**MODERATOR** : Ms S MANYUMWA

**NUMBER OF PAGES** : 4 PAGES & 8 MEASURING SHEETS & 1 GRAPH PAPER

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### **INSTRUCTIONS TO CANDIDATES**

1. ENSURE THAT YOUR STUDENT NUMBER IS CLEARLY MARKED ON ANY MEASURING SHEET OR ANNEXURES THAT YOU HAVE USED AND THEY ARE FIRMLY PLACED INSIDE YOUR EXAMINATION PAPER
2. POCKET CALCULATORS PERMITTED (ONLY ONE PER CANDIDATE)
3. ANSWER ALL QUESTIONS
4. CANDIDATES MAY USE THEIR OWN COPIES OF THE GENERAL CONDITIONS OF CONTRACT 2015,

**Question 1****[35]**

The table below gives information for a sewer pipe. Use the graph paper provided to plot the pipeline and take off quantities for the following items: (30)

- Excavation and backfill for pipeline trench
- Class C bedding and cradle for pipeline
- Pipelaying

Stake Value (m)	0	150	300	500	650	800	950	1 050	1 150	1 200
Ground level	72.50	72.40	71.15	71.30	70.00	69.70	69.90	70.10	70.50	70.70
Invert level	71.80	71.20	70.60	69.80	69.20	68.60	68.38	68.23	68.08	68.00
Pipe Size	300mm Ø Pipe					450mm Ø Pipe				

Once you have concluded the measure of quantities, draw up a suitable Schedule of Quantities as per the acceptable standard format in the Blue Book of the Civil Engineering Quantities (1990). (5)

**Question 2****[40]**

Estimate the rate and the amount for items in the following table:

Schedule of quantities					
Item	Description	Quantity	Unit	Rate	Amount
<b>1.</b> 1.1	<b>Earthworks</b> Excavate 3-4m deep in gravel for manhole Wheel and deposit excavated material 150m away from site. Then spread and level material in layers.	6	m <sup>3</sup>		
<b>2.</b> 2.1	<b>Concrete</b> 25 MPa / 19mm Reinforced concrete in columns	6	m <sup>3</sup>		

**Data sheet**

Labour rate : R15 / hr

Bricklayer : R30 / hr

Operator : R35 / hr

Concrete: Site mixing using 200ℓ hand fed drum mixer. Transporting and placing by labourers.

19mm stone

Hand compaction

Waste on cement - 3%

Waste on sand - 10%

Waste on stone - 10%

Material costs:

Cement - R60.00 / bag

Sand - R180 / m<sup>3</sup>

Stone - R230 / m<sup>3</sup>

Mixer hire rate: - R350 / day

Fuel - R10 / ℓ

Earthworks

Hand excavation by labourer

Excavated material must be loaded in wheelbarrows, deposited at a distance 150m away from the site.

Material must be spread and levelled.

NB: Where information is not clear, make reasonable assumptions.

**Question 3****[30]**

- 3.1 What are “Non-working times”? (3)
- 3.2 Write notes on the authority of the Engineer’s Representative, how he is appointed and his limitations. (5)
- 3.3 What is meant by “Care of the works” (2)
- 3.4 Briefly explain the concept of “Defect liability period” as outlined in the G.C.C 2015 document (2)
- 3.5 When is the contractor entitled to receive a Certificate of Practical Completion? (2)
- 3.6 During the construction phase of a contract involving the laying of pipes for a sewer system, heavy rains caused the collapse of open trenches resulting in damages to pipes already laid. (2)
- 3.7 Name, in sequence, the four certificates issued at the end of the contract. (4)
- 3.8 During the course of the construction of a water pipeline it is 'found that the piping, as laid, keeps bursting under test and normal loading and, therefore, must be removed, investigated, re-specified or supplied, and re-laid, tested and accepted in due course. Answer the following: -
- i). Who will approve the removal of the piping?
  - ii). Who will bear the cost of the investigation of the material?
  - iii). Who will bear the costs of the remedial work, including the costs of removal of the defective pipeline, the preparation for and re-laying, testing, and back-filling of the new pipeline? (10)