



ZIMBABWE

**MINISTRY OF HIGHER AND TERTIARY EDUCATION,
INNOVATION, SCIENCE AND TECHNOLOGY
DEVELOPMENT**

**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL DIPLOMA

IN

CIVIL ENGINEERING

SUBJECT: Civil Engineering Construction

**PAPER NO: 578/15/S03
578/22/S03**

DURATION: 3 Hours

MARCH / APRIL 2024 EXAMINATION

REQUIREMENTS

Ruler, pencil and pen

INSTRUCTIONS TO CANDIDATE

Answer any four (4) questions.

This paper consists of 3 printed pages.

QUESTION 1

- a) Calculate the mean compressive strength at 28 days and standard deviation for the following trial mix results for design strength of 25Mpa. The cubes were of size 100mm. What cement can you give from the results. The results are as follows:

1	2	3	4	5
560kN	495kN	500kN	575kN	530kN

(10 marks)

- b) State any six (6) forms of defects found in fresh concrete. (6 marks)
- c) Discuss advantages of using pre-stressed concrete. (9 marks)

QUESTION 2

- a) Discuss the following operations as used in Earthworks.

- i) Clearing (2 marks)
- ii) Stripping (2 marks)
- iii) Excavation (2 marks)
- iv) Hauling (2 marks)
- v) Stockpiling (2 marks)
- vi) Placing, compacting and finishing (2 marks)

- b) What do you understand by the term 'stabilisation'? And give five (5) materials for stabilisation of soils. (5 marks)

- c) i) Clearly state the difference between swell and shrinkage. (1 mark)

- ii) A soil mass has the following properties. Volumes of soil in natural state is $2,10m^3$. Volume of loose soil is $2,71m^3$.

Calculate the load factor as a percentage. (5 marks)

QUESTION 3

- a) Give four (4) types of road surfaces. (4 marks)
- b) Why are roads classified? And discuss four different classes of roads in Zimbabwe. (8 marks)
- c) Draw and clearly label a $\frac{7}{10}$ road. (8 marks)
- d) Give three (3) components of a pavement structure. (3 marks)

QUESTION 4

- a) What is solid waste management? (3 marks)
- b) State six (6) effects of solid waste management. (6 marks)
- c) Explain two (2) by-products of sanitary landfills. (6 marks)
- d) What is incineration? And give four (4) advantages of incineration and four (4) disadvantages of incineration. (8 marks)

QUESTION 5

- a) What are fixed costs on a project design? (3 marks)
- b) Explain tendering terms in Civil Engineering. (12 marks)
- c) What are the challenges faced by Small to Medium Enterprise (SMEs) in attaining contracts in Civil Engineering Works (a case study of Zimbabwe). (10 marks)

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NATIONAL DIPLOMA

IN

CIVIL ENGINEERING

MODULE: Civil and Construction Engineering PAPER NO: 578/23/M01

DURATION: 3 Hours

MAY / JUNE 2024 EXAMINATION

REQUIREMENTS

Calculator

INSTRUCTIONS TO CANDIDATE

1. Answer all questions.
2. Each question carries 20 marks.
3. Start each question on a new page.
4. Do not tear pages from the booklet.

This paper consists of 3 printed pages.

QUESTION 1

- a) Write short notes on the following types of tenders:
- i) Selective tendering
 - ii) Open tendering
 - iii) Negotiated tendering
- (15 marks)
- b) Identify any five (5) Gant chart software for Civil Works. (5 marks)

QUESTION 2

- a) Calculate the output per hour if the scrapper works for:
- 50 min per hour
Operating factor of 0,83
Load is 12m³
Fixed time including loading, dumping, turning, accelerating, decelerating = 2,0 minutes
Haul time in full load for 100m at 20km/hr = 3,0minutes
Return time for 100m at 40km/hr = 1,7 minutes
(10 marks)
- b) What are the factors mainly considered during large excavations? (5 marks)
- c) A set of 10 concrete cubes were tested for strength with the following results given in N/mm².
- 27; 26; 25; 26; 24; 28; 25; 23; 27; 29
- i) Calculate the target mean strength and standard deviation. (5 marks)
 - ii) Calculate the target mean strength if a characteristic strength of 25MPa was specified and the current margin is 1,64 times the standard deviation.

QUESTION 3

Describe the phrase “critical path analysis” as used in project management. (20 marks)

QUESTION 4

Discuss steps for concrete mix design. (20 marks)

QUESTION 5

a) Explain the following terms as used in Civil Engineering.

- | | | |
|------|-----------------------|-----------|
| i) | Depreciation | (2 marks) |
| ii) | Building factor | (2 marks) |
| iii) | Swell | (2 marks) |
| iv) | Average haul distance | (2 marks) |
| v) | Waste | (2 marks) |
| vi) | Back haul | (2 marks) |

b) Establish the cost of excavating a tank 1m wide, 2m deep and 200m long for the following conditions.

20 laborers

1 supervisor

Established rate of excavation = $0,2\text{m}^3/\text{hour}$ / labourer

Wages \$50/hr/labourer

Over head cost = 15%

Profit = 20%

Calculate the amount of money for excavating of the earth if supervisor's paid \$100/hr. (8 marks)

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