



ZIMBABWE

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

**HIGHER EDUCATION EXAMINATIONS COUNCIL
(HEXCO)**

NATIONAL CERTIFICATE

IN

CIVIL ENGINEERING

MODULE: Road Designing

PAPER NO: 313/22/M07

DURATION: 3 Hours

OCTOBER/NOVEMBER 2024 EXAMINATION

REQUIREMENTS

INSTRUCTIONS TO CANDIDATE

1. Answer any five (5) questions.
2. Start each question on a fresh page.
3. Do not write anything on the question paper.
4. Do not tear off pages from the answer booklet.

QUESTION 1

- a) Give an outline of the factors considered in the design of an urban road. (10 marks)
- b) Draw a well labelled diagram to show the cross- section of a typical urban roadway. (10 marks)

QUESTION 2

- a) Describe the characteristics of an ideal gravel for road construction. (10 marks)
- b) Develop a maintenance programme for a rural high traffic unsealed (unpaved) road. (10 marks)

QUESTION 3

- a) What is your understanding of the term “soil stabilisation” in road construction? (5 marks)
- b) Explain five (5) ways which you can use to stabilise soil during road construction. (15 marks)

QUESTION 4

- a) Explain the following terms as they apply in road designing:
 - i) Deflection angle
 - ii) End of curve
 - iii) Tangent
 - iv) Mid- ordinate distance
 - v) Apex distance (10 marks)
- b) Vertical curves clearly show one aspect in road designing. With aid of labelled diagrams explain the different types of vertical curves. (10 marks)

QUESTION 5

- a) Outline bitumen properties that make it a suitable binder in road construction. (5 marks)
- b) Discuss the main difference between stable 60 and MC 30 emulsion. (6 marks)
- c) Road marking points are used to enhance road visibility, clearly explain the different categories of the road marking paints. (9 marks)

QUESTION 6

- a) List any five (5) road designing software's. (5 marks)
- b) Discuss the major causes of road failures and mitigating measures. (10 marks)
- c) Clearly explain the significance of a topographical survey in road design. (5 marks)

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