ZIMBABWE

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

HIGHER EDUCATION EXAMINATIONS COUNCIL (HEXCO)

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 $12m^3$
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/mm^2.

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 = 0,2m^3/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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