



PROGRAM : BACHELOR OF ENGINEERING TECHNOLOGY
IN CIVIL ENGINEERING

SUBJECT : **CONSTRUCTION METHODS & SAFETY 1B**

CODE : **CMSCIB1**

DATE : JANUARY SSA EXAMINATION
06 JANUARY 2020

DURATION : (SESSION 2) 11:30 - 13:30

WEIGHT : 40 : 60

TOTAL MARKS : 100

ASSESSOR : H ZONDI

MODERATOR : MA KASENGE

NUMBER OF PAGES : 9 PAGES

INSTRUCTIONS : ONLY ONE POCKET CALCULATOR PER CANDIDATE
MAY BE USED.
THIS QUESTION PAPER MUST BE SUBMITTED WITH
THE ANSWER SHEET

REQUIREMENTS : NONE.

INSTRUCTIONS TO STUDENTS

PLEASE ANSWER ALL QUESTIONS.

QUESTION 1

- 1.1 _____ is the term used to describe recycled water from households. It is not fit for drinking but can be used to water gardens or flush toilets.
- 1.2 _____ is a term used to describe the very fine soil particles carried in suspension when water flows fast.
- 1.3 _____ bridges use two main cables spanning between two towers. The road is suspended from the cables using hangers.
- 1.4 The Nelson Mandela Bridge in Johannesburg CBD is a _____ bridge.
- 1.5 _____ joints are used principally to accommodate horizontal expansion.
- 1.6 _____ are defined as being supports to the end span of a bridge deck.
- 1.7 _____ is encountered when steel wires are tensioned before the concrete is poured into the mould.
- 1.8 Underwater tunnels are constructed using _____ tubes.
- 1.9 _____ is a material (steel, concrete, precast concrete) used as an interior covering and to help strengthen the soil in the tunnel.
- 1.10 The _____ procedure involves pushing sections of pipe using primary rams through the ground from a pit. Excavation takes place behind the shield as the driving proceeds.
- 1.11 The 'older' tunnelling method whereby the complete tunnel lining was constructed of brickwork is called _____.
- 1.12 Gravity retaining walls are also called _____ and rely on their own mass and the friction on the underside of the wall to overcome the tendency to slide or overturn.

- 1.13 _____ are non-permanent components of a structure - for example, people, furniture and vehicles.
- 1.14 The _____ must be established on the site so that all construction work can be related to this fixed point.
- 1.15 Self-weight loads are permanent components of a structure - for example, foundations, walls, columns, beams and slabs.

[15]

QUESTION 2

Indicate whether the following statements are true or false.

- 2.1 One of the main functions of the Workman's Compensation Act is to prevent industrial accidents.
- 2.2 Scour is deposition of sediments on the reservoir floor, which will eventually lead to a shallower reservoir.
- 2.3 A zoned dam is an earth-filled dam that has a core wall in the centre. The core wall is made from a mixture of clay and sand.
- 2.4 One advantage of earth dams is that floodwaters may pass over the dam during and after the construction period without endangering the structure.
- 2.5 Freeboard is the difference between the top of the dam wall and the maximum level that the water in the dam may rise.
- 2.6 Rip-rap is the top part of the embankment of a dam. It is normally 3.0 m wide and is often used as a road.
- 2.7 Another water conservation practice that has become acceptable throughout the world is to recycle domestic water. This is commonly called grey water and it can be used for various other purposes.
- 2.8 Prestressed concrete has lower labour costs because it requires low-strength concrete and steel and uncomplicated production process.

-
- 2.9 An arch bridge has a concave upwards shape, whereas a suspension bridge is exactly the opposite (convex upwards).
- 2.10 In a cantilever bridge construction, the entire bridge deck is built in sections on one side of the span, as each section is completed it is pushed out of the shutter, over the piers until the bridge deck extends and reaches the opposite abutment.
- 2.11 An abutment to a bridge may be simply defined as the support to the end span at an embankment or cutting of the bridge deck.
- 2.12 Piles, like abutments, support the bridge deck but occur within the length of the deck rather than at the ends.
- 2.13 The method used in tunnel construction will also depend on the type of tunnel required and its function.
- 2.14 When a brine solution is piped in to very unstable soil, on contact the ground freezes in the vicinity of the pipes, and allows for more stable excavation.
- 2.15 A conventional shield is a material (steel, concrete, precast concrete) used as an interior covering and to help strengthen the soil in the tunnel.

[15]**QUESTION 3**

- 3.1 Define fully the following terms: (10)

3.1.1 Backfill

3.1.2 Shallow foundation

3.1.3 Plain concrete

3.1.4 Portal frame structure

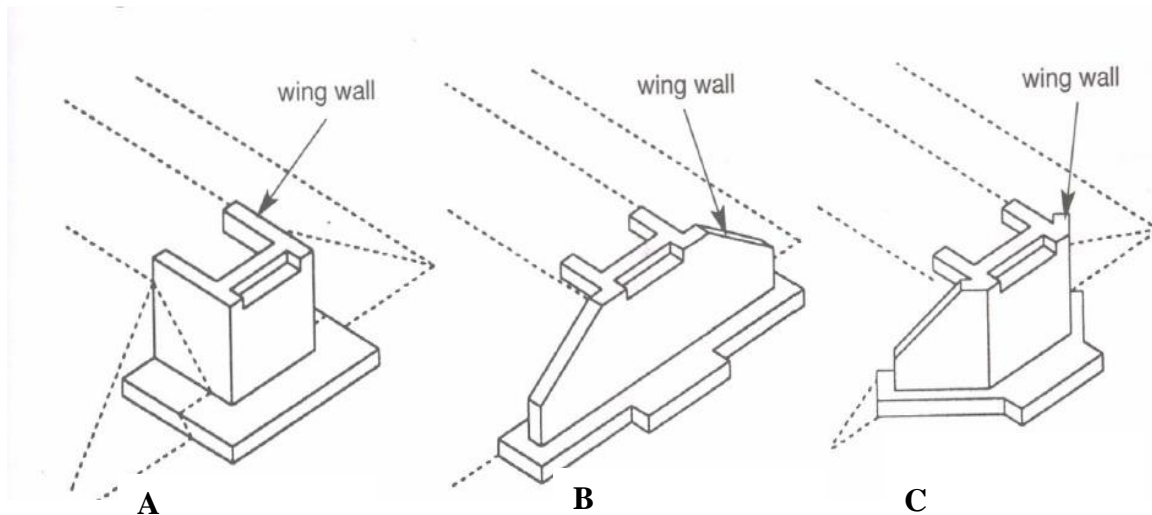
3.1.5 Formwork

[10]

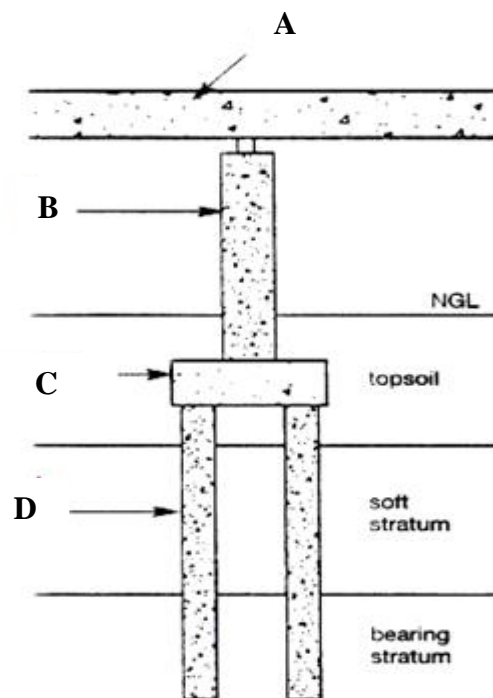
QUESTION 4

4.1 What are the two types of bridge abutment and state their purpose/s (4)

4.2 The diagram below shows different types of wing walls. Label A to C correctly. (3)



4.3 Label the following diagram of a typical bridge pier. (4)



QUESTION 5

- 5.1 After the steel (reinforcement) has been fixed on site using bending schedule, what are you supposed to physical check as representative engineer/technologist before you approve the pouring of concrete? (5)
- 5.2 What is your understanding about cantilever retaining walls (5)

[10]

QUESTION 6

- 6.1 What type of accidents are supposed to reports to the inspector according to Machinery and Occupational Safety Act. (4)
- 6.2 Trench collapse endangers both public and workers lives. What are the five causes of trench collapses? (6)
- 6.3 What are the six common accidents that will happen if the contractor does not practice good housekeeping? (6)
- 6.4 Why construction industry is regarded as one of the most hazardous industries in the world? (2)
- 6.5 How many people are supposed to be employed before the management is obliged to provide an adequately stocked first-aid box? (1)
- 6.6 How many people are supposed to be employed before the management is obliged qualified first aider? (1)

[20]

QUESTION 7

- 7.1 Vitrified clay pipes are:
- A. Oven baked in high temperature
 - B. Very popular in drainage
 - C. No longer used due to brittleness
 - D. All of the above

- 7.2 Clay pipes specification should comply with:
- A. SANS 559
 - B. SANS 21500
 - C. SANS 1500
 - D. none of the above
- 7.3 Rubber rings used in clay pipes should comply with:
- A. SANS 900
 - B. SANS 2001
 - C. SANS 559
 - D. SANS 974
- 7.4 When designing some drainage systems ensure the gradients for drainage are laid at:
- A. 1:20 to 1:2
 - B. 1:40 to 1:4
 - C. 1:60 to 1:6
 - D. 1:80 to 1:8
- 7.5 Where it is necessary to have a pipe shallower than minimum, it should be surrounded by of concrete.
- A. 75 mm
 - B. 150 mm
 - C. 225 mm
 - D. 300 mm
- 7.6 Why concrete anchor block used in pipe laying?
- A. To acts as an joint filler
 - B. To prevent seepage of sewerage
 - C. To prevent pipes from moving
 - D. All of the above
- 7.7 What are the underground drains or pipes used to carry waste matter from domestic or industrial areas?

- A. Bores
- B. Sewers
- C. sewage
- D. sewerage

7.8 What is the term used to refer to the length of time rainfalls?

- A. Runoff coefficient
- B. Storm intensity
- C. Storm duration
- D. Manning's principle

7.9 Natural or artificial lake for collecting and storing water for domestic or human consumption is called:

- A. Conduits
- B. Reservoirs
- C. Tanks
- D. Dams

7.10 Class bedding where the granular material is carried 150mm above the top of the pipe.

- A. Class A
- B. Class B
- C. Class BB
- D. Class C

7.11 There are no special precautions required for this class of bedding except that the subgrade must fully support the pipe along its length.

- A. Class C
- B. Class D
- C. Class B
- D. Class A

7.12 bedding is the most common bedding for pipes up to 300 mm diameter.

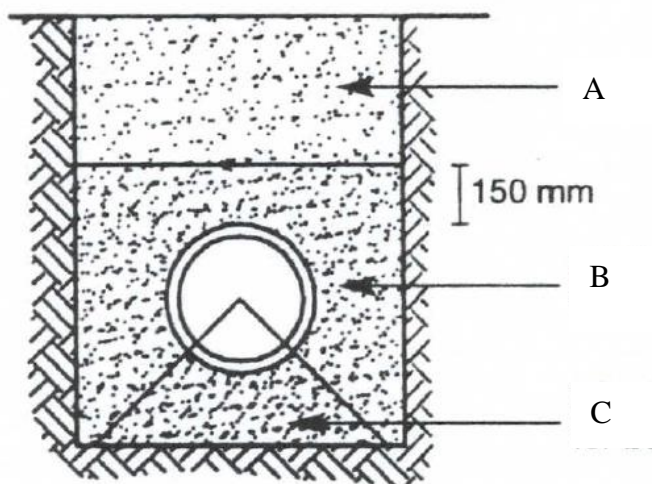
- A. Class B
- B. Class C
- C. Class D
- D. All of the above

[12]

QUESTION 8

8.1 Fully define homogenous dam (5)

- 5.1 The diagram below is a section through class BB bedding used for pipe backfill. Label all the layers correctly. (3)



[8]

TOTAL MARKS = 100