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CIVIL ENGINEERING TECHNICIAN LEVEL 6

CON/OS/CET/CR/04/6/A

CARRY OUT ROAD CONSTRUCTION WORKS

July/August 2024

TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION COUNCIL (TVET CDACC)

WRITTEN ASSESSMENT

TIME: 3 HOURS

INSTRUCTIONS TO CANDIDATE

1. This paper has two sections A and B.
2. Answer ALL the questions as guided in each section
3. You are provided with a separate answer booklet.
4. Marks for each question are indicated in the brackets.
5. Do not write on the question paper.

This Paper Consists of THREE (3) Printed Pages.

Candidates should check the question paper to ascertain that all pages are printed as indicated and that no pages are missing

SECTION A (40 MARKS)

Answer ALL questions

1. Earth moving plants and equipment are essential in road construction. Outline THREE advantages of hiring over purchasing earth moving plant and equipment. (3 Marks)
2. A pavement surface is normally constructed with unique features to enable it function effectively. Explain the following terminologies as used in pavement surface construction.
   a. Center line. (2 Marks)
   b. Camber. (2 Marks)
   c. Shoulder breakpoint. (2 Marks)
3. Before road construction starts, the site has to be assessed and a report issued to guide design and cost of the construction. State the FOUR stages of site investigation. (4 Marks)
4. Massive work done during road construction is earthworks. Outline any FOUR types of earth moving plants. (4 Marks)
5. Compaction enables a layer material to attain required density for it to carry design loads. Differentiate between static and vibratory compactors giving an example of plant or equipment used in each. (4 Marks)
6. Erosion of adjacent soil affects the integrity and durability of a road/pavement. Outline TWO ways of controlling the effects of erosion. (2 Marks)
7. Maintenance of a pavement is a regular activity carried out within its life span. Describe TWO strategies used in maintaining a rigid pavement. (4 Marks)
8. Rigid and flexible pavements differ in various ways. Outline any FOUR aspects that differentiate their service functionality. (4 Marks)
9. Installation of culvert is one way of ensuring that a road is well drained. Outline any THREE types of culverts used in road construction. (3 Marks)
10. Construction plant and equipment must be operated and maintained properly. Outline FOUR primary inspection/checks performed on construction machinery. (4 Marks)
11. Road furniture is a very important feature after completion of a road construction. Define the term road furniture. (2 Mark)

SECTION B (60 MARKS)

Answer any THREE questions

12. Footbridges walk ways, cyclist lanes and bus bays are essential, especially in ensuring safety of pedestrians in busy highways.
    a. Explain FIVE factors to consider in footbridge construction to ensure its safety to the user. (10 Marks)
    b. Describe THREE functional requirements of walk ways, cyclist lanes and bus bays. (6 Marks)
    c. Explain any TWO disadvantages of grade separated pedestrian crossings/footbridges. (4 Marks)
13. The construction of a road based on a given cross-section involves several key steps, each ensuring that the road meets design specifications and standards.
    a. Sketch a well labeled cross section of a flexible pavement. (10 Marks)
    b. Discuss in detail the layers of a flexible pavement. (10 Marks)
14. Road furniture plays a crucial role in creating a safe, efficient, and user-friendly road environment. Proper planning, installation, and maintenance of road furniture are essential for maximizing these benefits and ensuring the smooth operation of road networks.
    a. Describe THREE broad categories of traffic sign. (6 Marks)
    b. Explain FIVE characteristics of road/traffic signs which make them obtain greatest efficiency of usage. (10 Marks)
    c. State any FOUR uses of bollards on the roads. (4 Marks)
15. Highway drainage and hydraulic structures serve the key purpose of ensuring that road layers are constantly and continually drained of water that would otherwise compromise their stability and durability.
    a. Describe the THREE parts of a bridge. (6 Marks)
    b. Explain THREE functions of sub-surface drainage system. (6 Marks)
    c. Discuss FOUR factors to consider in the design of subsurface drain. (8 Marks)

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