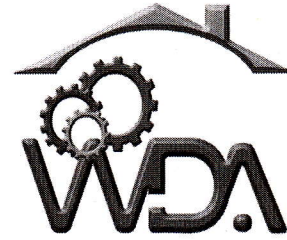CST – Construction Surveying and Site Management

**T019**

Wednesday, 29/11/2017
08:30 – 11:30 AM

WORKFORCE DEVELOPMENT AUTHORITY

P.O. BOX 2707 Kigali, Rwanda Tel: (+250) 255113365

# ADVANCED LEVEL NATIONAL EXAMINATIONS, 2017, TECHNICAL AND PROFESSIONAL STUDIES

**EXAM TITLE:**

**CONSTRUCTION SURVEYING AND SITE MANAGEMENT**

**OPTION:** Construction (CST)

**DURATION: 3 hours**

## INSTRUCTIONS:

The paper is composed of **three (3) main Sections** as follows:

| | |
|---|---|
| **Section I: Fourteen (14) compulsory** questions. | **55 marks** |
| **Section II**: Attempt **any three (3)** out of five questions. | **30 marks** |
| **Section III**: Attempt **any one (1)** out of three questions. | **15 marks** |

## Note:

*Every candidate is required to carefully comply with the above instructions. Penalty measures will be applied on their strict consideration.*

## Section I. Fourteen (14) Compulsory questions                 55 marks

**01.**  Distinguish direct method of leveling from indirect method of leveling.

**4 marks**

**02.**  Mention any ten factors that are considered during the construction site preparation.                 **5 marks**

**03.**  A 30 m steel tape was standardized under 60N pull at 65°F. It was suspended in 5 equal spans during measurement. The mean temperature during measurement was 90°F and the pull exerted was 100N. The area of the cross-section of the tape was 8mm². Find the true length of the tape, if, $a = 6.3 \times 10{-6}/°F$, $E = 2 \times 10^5 N/mm2$ and unit weight of steel = 78.6kN/m3.                 **6 marks**

**04.**  Failure to plan the site layout in advance is a prime cause of operational inefficiency, and can increase the overall cost of a project substantially. List four main problems that may occur in the absence of a precise site layout plan.                 **4 marks**

**05.**  Clearly differentiate the terms azimuth and bearing as used in surveying.                 **4 marks**

**06.**  Distinguish the following three purposes of the stock:

Stock trading; Stock care; Stock speculation.                 **3 marks**

**07.**  The following table indicating the types of large equipment that can be found in the store. State their use.                 **5 marks**

| S/N | Type of large equipment in the store | Use of the equipment |
|-----|--------------------------------------|----------------------|
| 1.  | Bulldozer                            |                      |
| 2.  | Dozer                                |                      |
| 3.  | Scrapper                             |                      |
| 4.  | Roller                               |                      |
| 5.  | Water Pump                           |                      |

**08.**  Briefly discuss the sources of error in surveying.                 **3 marks**

**09.**  List and explain the four essential parts of a level.                 **4 marks**

**10.**  What are the necessary actions that may be taken in receiving goods?                 **3 marks**

**11.**  In site management what do you understand by:

**(a)** Construction site, and **(b)** Stock control.                 **3 marks**

**12.** Briefly explain what the " plant notebook" is. **2 marks**

**13.** Give three categories of equipment and plants and in each category give three examples. **6 marks**

**14.** Briefly explain what the term "contingency" is in the project cost estimating. **3 marks**

## Section II. Choose and answer any three (3) questions. **30 marks**

**15.** Discuss the facilities services of a well-managed site. **10 marks**

**16.** A levelling was done using a level and a rod; the rod reading at a point of known elevation was 4.71m, the rod reading at a point of unknown elevation was 2.80m and the elevation of known point was 410.26m.

i. What is this type of levelling?

ii. How do you call the point of known elevation?

iii. How do you call the rod reading at a point of known elevation?

iv. How do you call the rod reading at a point of unknown elevation?

v. How do you call the sum of rod reading at a point of known elevation and the elevation of known point?

vi. What is the elevation of the unknown point for this case?

vii. Use a sketch and show all the readings. **10 marks**

**17.** Describe the steps involved in making the map. **10 marks**

**18.** Determine the value of included angles in a closed compass traverse ABCD conducted in clockwise direction, given the following fore bearing of the respective lines. Use a sketch and show these fore bearings **10 marks**

| Line | F.B |
|------|------|
| AB | 40° |
| BC | 70° |
| CD | 210° |
| DA | 280° |

**19.** Using the rise and fall method, calculate the elevations of the point B to D if the elevation of the point A (B.M) is 38.329. Also the arithmetic check has to be mentioned. **10 marks**

| Stations | B.S | I.S | F.S | RISE | FALL | R.L | Remarks |
|---|---|---|---|---|---|---|---|
| A | 1.736 | | | 1.736 | | 38.329 | 38.329 |
| B | | 1.429 | | | 0.307 | 36.593 | 36.593 |
| C | | 1.882 | | | 0.453 | 36.14 | |
| D | | | 2.173 | | 0.291 | 35.849 | 38.038 |

3.152  -0.529.1

## Section III. Choose and answer any one (1) question.          15 marks

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**20.** Determine the surface of the following traverse by the use of all possible coordinate methods:

| STATION | A | B | C | D |
|---|---|---|---|---|
| X | 100 | 104 | 353 | 357 |
| Y | 100 | 208 | 223 | 100 |

**21.** The following consecutive readings were taken with a level and a 4.0 m staff on continuously sloping ground at a common interval of 30 m:

0.780, 1.535, 1.955, 2.430, 2.985, 3.480, 1.155, 1.960, 2.365, 3.640, 0.935, 1.045, 1.630 and 2.545

The reduced level of the first point A was 180.750m. Rule out a page of a level field book and enter the above readings. Calculate the reduced levels of the points by the collimation system and the rise and fall system.

**22.** Estimate the quantity of earthwork for a portion of road from the following data

| Chainage | 0 | 1 | 2 | 3 | 4 | 5 | 6 | 7 | 8 | 9 |
|---|---|---|---|---|---|---|---|---|---|---|
| Reduced Level (RL) | 7.50 | 7.70 | 7.50 | 7.25 | 6.85 | 6.95 | 6.70 | 6.45 | 6.30 | 5.95 |

The formation level at Chainage 0 is 8.0 and having falling gradient of 1 in 100. The top width is 12m and side slopes $1\frac{1}{2}$ horizontal to 1 vertical. Assuming the transverse direction is in level, calculate the quantity of earthwork by using the trapezoidal and prismoidal formula.          Take 1 chain = 20m

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