

**T114**

**PLB - Cost estimation and  
Topography**

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**Wednesday, 21/7/2021  
08:30 - 11:30 AM**

**TVET NATIONAL EXAMINATION, RTQF LEVEL 5, 2020-2021**

**OPTION/TRADE: PLUMBING  
SUBJECT: Cost estimation and Topography**

**DURATION: 3 hours**

**INSTRUCTIONS TO CANDIDATES: PART II**

The paper is composed of two (2) Sections as follows:

**Section I: Attempt all the Twelve (12) questions (60 marks)**

**Section II: Attempt any Four (4) questions out of Six (6) (40 marks)**

# **MARKING GUIDE**

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## Section I : Attempt all the Twelve (12) questions (60 marks)

\*01. Give the complete meaning of the following words: / 5 marks

a) A cost estimate

**Marking scheme:**

A cost estimate: is compilation of many elements, an approximate of a probable quantity and unit cost of each of the elements

b) Actual cost

**Marking scheme:**

Actual cost is the cost of materials and labor used as work is completed

02. State the main requirements for preparing an estimate /5 marks

**Marking scheme:**

the main requirements for preparing an estimate:

- a) Drawing li plans, elevation, section, (drawing must be clear and with complete dimensions)
- b) Detailed pacifications workmanship and properties of materials
- c) Standard schedule of rates of the current year

03. Outline the steps of work duration determination / 5 marks

**Marking scheme:**

steps of work duration determination:

Time of each task

Determination of concurrent tasks

Total time

04. Give the key points for determining the work extent in any construction project / 5 marks

**Marking scheme:**

The key points for determination of work extent in a project are:

Working place

Duration

Outdoor location (External)

Indoor location (internal)

Complexity

Maintenance cost

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05. Discuss clearly the types of bills of quantities and state its importance.

/5marks

**Marking scheme:**

The types of bills of quantities

- Approximate bills of quantities: bills of quantities contain the provisional quantities
- Firm bills of quantities contains lump sum of project
- Specified bills of quantities contains items and their specifications

**Importance :**

- a) Enables all construction tendering for construction to price on exactify the same information with minimum effort
- b) Planning and progressing by contractors site planner
- c) All for better comparison
- d) Ordering of materials
- e) Cost analysis for used in future
- f) Financial accounting

06. give the Definitions of these terms used in leveling: /10 marks

- g) a) datum;
- h) b) reduced level ;
- i) c) benchmark ;
- j) d) height of instrument;
- k) e) change point

**Answer**

Definitions of some terms used in construction surveying: /5 marks

- a) **Datum:** is an imaginary surface with respect to which the height of different points on the earth surface are determined.
- b) **Reduced level** of a point: the reduced level of a point is its vertical distance above or below the datum.
- c) **Benchmark:** is a fixed point on the ground of known elevation.
- d) **Height of instrument:** is the elevation of the line of collimation above the datum.
- e) **Change point / turning point:** is an intermediate station on which two readings are taken while the positions of the instrument are shifted.

07. Identify at least 5 types of estimate

/5marks

**Marking scheme:**

Types of estimate

- 1) Plinth area estimate
- 2) Cubic rate estimate

- 3) Approximate quantity method estimate
- 4) Detailed estimate or item rate estimate
- 5) Revised estimate

**08.** What do you understand the term specification /5marks

**Marking scheme:**

- i. General Specifications: This gives the nature, quality, class of work and materials in general terms to be used in various parts of work. It helps to form a general idea of building.
- ii. Detailed Specifications: These give the detailed description of the various items of work laying down the Quantities and qualities of materials, their proportions, the method of preparation workmanship and execution of work

**09.** Identify the steps of estimate in construction work /5marks

**Marking scheme:**

- Steps of estimate in construction work
    1. Take off
    2. Squaring out
    3. Abstract
- 10.** Estimate the quantities of brickwork and plastering in a wall 4m long, 3m height and 30 cm thick. Calculate also the cost if the rate of brickwork is Rs.320 per m<sup>3</sup> and of plastering is Rs.8.50 per m<sup>2</sup>.

**/5marks**

Answer 1:

Quantity of brickwork:  $L \times B \times H = 4\text{m} \times 3\text{m} \times 0.30\text{m} = 3.6 \text{ m}^3$

Quantity of plastering (2 faces):  $2 \times L \times H = 2 \times 4\text{m} \times 3\text{m} = 24 \text{ m}^2$

Cost of brickwork:  $3.6 \text{ m}^3 \times 320 \text{ Rs/ m}^3 = \text{Rs.}1152.0$

Cost of plastering:  $24 \text{ m}^2 \times 8.50 \text{ Rs/m}^2 = \text{Rs.}204.0$

Total cost =  $\text{Rs.}1152.0 + \text{Rs.}204.0 = \text{Rs.}1356.0$

**11.** Mention five (5) qualities of good estimate /5marks

**Marking scheme:**

1. It should be accurate
2. It should be clear and specific
3. It should be single grand total
4. It should be prepared according to project specification
5. It should be comprehensible
6. It identify the value of components

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12. Determine the areas in hectares between the line AB for the offsets taken at a regular interval of 10 m along the line AB. Use both mid-ordinate rule and trapezoidal rule. if the offsets are 28m, 30m, 32m, 33m, 35m, 32m, 29m

**Answer**

**By mid-ordinate rule**

A = Average ordinate \* length where  $L = nd$ ,  $d = 10m$

$$A = \frac{h_1 + h_2 + h_3 + \dots + h_n}{n} * L$$

$$A = (h_1 + h_2 + h_3 + \dots + h_n) * d$$

$$A = (29 + 31 + 32.5 + 34 + 33.5 + 30.5) * 10 = 1905m^2 \quad /2.marks$$

By trapezoidal rule

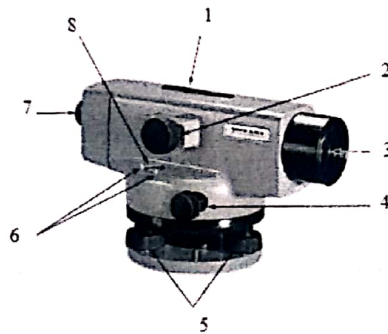
A = strip width [1/2(first+last ordinates) + middle ordinates]

$$A = 10 [1/2(28+29) + 30 + 32 + 33 + 35 + 32]$$

$$A = 1905m^2 \quad /2.marks$$

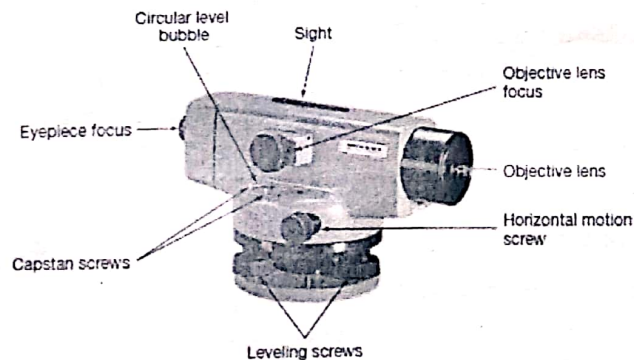
**Section II: Attempt any Four (4) questions out of Six (6) (40 marks)**

13. The figure below is a dumpy level. Give the parts as shown



**Answer:**

► The names of dumpy level parts



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14. a) What are overheads

**Marking scheme:**

Overhead costs are the costs that can not be related to any specific item of work

b) Explain office overheads by giving six (6) examples

**Marking scheme:**

Office overheads : these are the costs related to the home office

examples: office rent, supplies, legal expenses, travel expenses, bidding expenses and salaries of office persons /10marks

15. Enumerate the elements of invoice /10marks

**Marking scheme:**

- Standout Header ;  Invoice number ;  Company's information
- Date ;  Goods or services sold: item name or title of service price of the item/service Amount or quantity of product or service)
- Fees or Taxes
- Total amount due
- Terms of the transaction
- A unique message
- Due date

16. a) Define an invoice

**Marking scheme:**

An invoice, sometimes called a sales invoice or bill, is a document issued by a business to indicate a Transaction, and to request payment for a product or service provided.

b) Outline the functions of invoice

**Marking scheme:**

Functions of invoice

- Maintaining records
- Payment tracking
- Legal protection
- Easy tax filling
- Business analytic
- Facilitation of inspection
- Easy preparation of sold account

/ 10marks

Reference: LU.3 Calculate the cost estimation

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**17. a) Give the meaning of a quantity surveyor**

**/5marks**

**Marking scheme:**

A quantity surveyor is a professional working within the construction industry concerned with building cost. The main role of quantity surveyor is to estimate the cost of civil engineering work.

Every good quantity surveyor must have a good knowledge of building materials and construction (should provide correct calculation) and be able to visualize drawings and details.

A quantity surveyor is a descriptive title in which despite the role provided by a profession in producing a bill of quantity. e cost of civil engineering work.

**b) Outline at least 10 duties of quantity surveyor**

**Marking scheme:**

1. Checks the drawing
- 2 . measures the quantities of work to be done and established their cost
3. Establishes the general requirement
4. Prepare the bills of quantities and other bidding and contract documents
5. Advises in selection of contractors
6. Giving legal advise in case of court proceedings
7. Checks application for payment and settles construction account
- 8 Preparing bills of quantities
9. Negotiate for rate with contractors and dealing with the cost reimbursement contract
- 9 Valuing work in progress and making recommendation as payment to make to contractors including advising on the financial effect of alteration

**/10marks**

**18.**The elevation of a point P is to be determined by observation from adjacent stations of a theodolite survey, the staff was held vertically up on the point and the instrument is fitted with anallatic lens, the constant  $K=100$ . Compute the distance of A and B from P and also compute the elevation of P.

Given the following data: **./10 Marks**

Theodolite station	height of instrument (hi)	staff point	Angle( $\theta$ )	staff reading(m)	elevation(m)
A	1.42	P	$2^\circ 24'$	1.23, 2.05, 2.88	77.75
B	1.4	P	$-3^\circ 36'$	0.785, 1.80, 2.815	97.135

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