GENERAL CERTIFICATE OF EDUCATION BOARD

Technical and Vocational Education Examination

SURVEY, SOIL MECHANICS AND MATERIALS 2
5230

JUNE 2022 **INTERMEDIATE LEVEL**

Specialty Name and Acronym	**CIVIL ENGINEERING BUILDING CONSTRUCTION – CE-BC (F4 BA)**
Subject Title	**SURVEY, SOIL MECHANICS AND MATERIALS**
Subject Code No.	**5230**
Paper No.	**2**

Duration: 3 HOURS

INSTRUCTIONS TO CANDIDATES

This Paper has **THREE** (3) SECTIONS (A, B and C).

SECTIONS A: Answer TWO Questions.

SECTIONS B: Answer ONE Question.

SECTIONS C: Answer ONE Question.

All questions carry equal marks

Precise answers should be given and where necessary support them with neat sketches

All answers should be corrected to two decimal places.

Take π=3.14, density of water =1000kg/m^3, g =10m/s^2, level constant "C"=100.

Mathematical Sets and Non-Programmable Calculators are allowed.

You are reminded of the necessity for good English and orderly presentation in your answers.

SECTION A: MATERIALS (Answer any TWO Questions)

QUESTION ONE: **(25 marks)**

a) Define admixture and name four types that are used in civil engineering. **(5 marks)**
b) List and define four factors that affect workability of freshly mixed concrete. **(4 marks)**
c) Define igneous rocks and give two examples. **(4 marks)**
d) What is the principal raw material used in the manufacturing of ordinary Portland cement? **(4 marks)**
e) Elaborate the wet process used in the manufacturing of ordinary Portland cement. **(8 marks)**

QUESTION TWO: **(25marks)**

Your village development association (VDA) has decided to modernise the palace museum by using wood in constructing the library section of this museum. You were asked to advice the VDA by answering the following questions:

a) Name two types of wood and give two characteristics of each. **(4 marks)**
b) Define the following parts of a cut tree.
- i) pith
- ii) heartwood
- iii) sap wood
- iv) medullary rays **(8 marks)**

c) Give two methods of sawing timber. **(4 marks)**
d) Define laminated wood and give one advantage and one dis-advantage of this wood. **(6 marks)**
e) Define the term "warping" in timber technology. **(3 marks)**

QUESTION THREE: **(25marks)**

a) List and define two properties of harden concrete. **(8 marks)**
b) What is the influence of water / cement ratio to the strength of concrete? **(4 marks)**
c) Give four commercial sizes of timber sold in the Cameroonian market. **(4 marks)**
d) What is the name given to the binder used in flexible pavement? Give two examples. **(4 marks)**
e) Match the following joints (Butt, Dovetail, Mortice and tenon, Lapped and Finger) to the diagrams given in fig 1. **(5marks)**

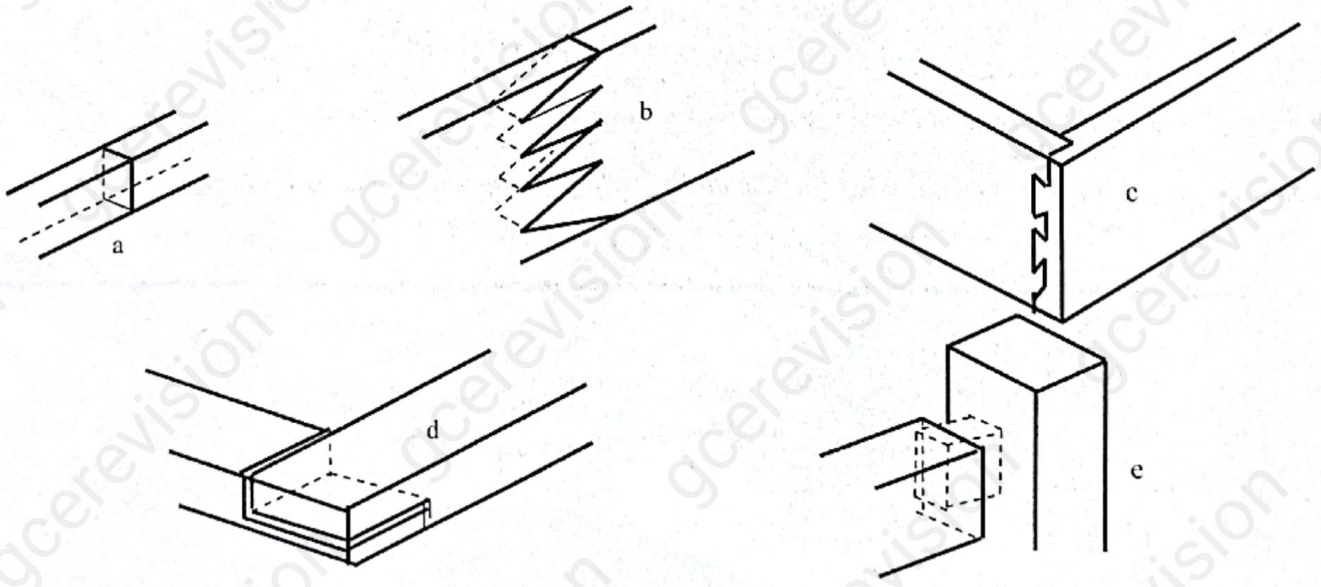


Fig 1

SECTION B: SOIL MECHANICS (Answer any one question)

QUESTION FOUR: **(25 marks)**

a) Define soil as seen by a civil engineer and give two uses in civil engineering. **(5 marks)**
b) State a laboratory test that is used to determine the consistency of cement,
c) state the apparatus used, test procedure and interpretation of results **(8 marks)**
d) What is the difference between elastic limit and plastic limit of a soil? **(4 marks)**
e) Draw and label the diagram of the vertical section of a soil from bed rock to the topmost layer. **(8 marks)**

QUESTION FIVE: **(25 marks)**

a) Name and define four types of rocks. **(8 marks)**
b) Define consolidation of soil. **(4 marks)**
c) Give the name and the main apparatus used in the laboratory to determine the shear resistance of soil. **(5 marks)**
d) Below are the specimens results obtained in the laboratory during a slump test.
(See Fig 2) You are called upon to;
- State the name of the different slumps. **(4 marks)**
- Give the significance of the results. **(4 marks)**

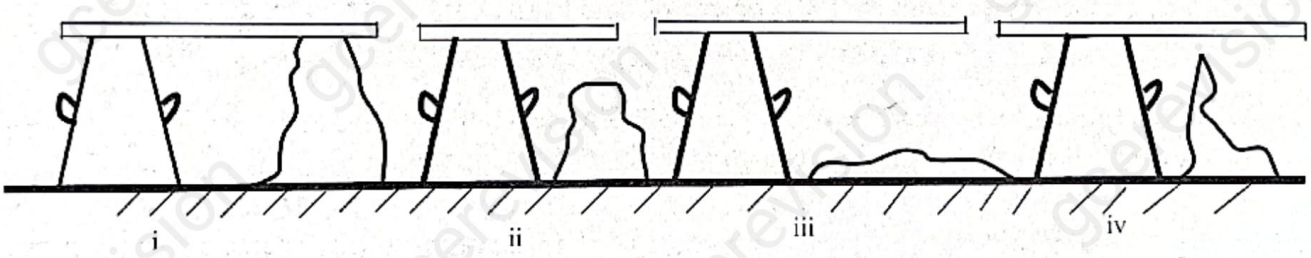
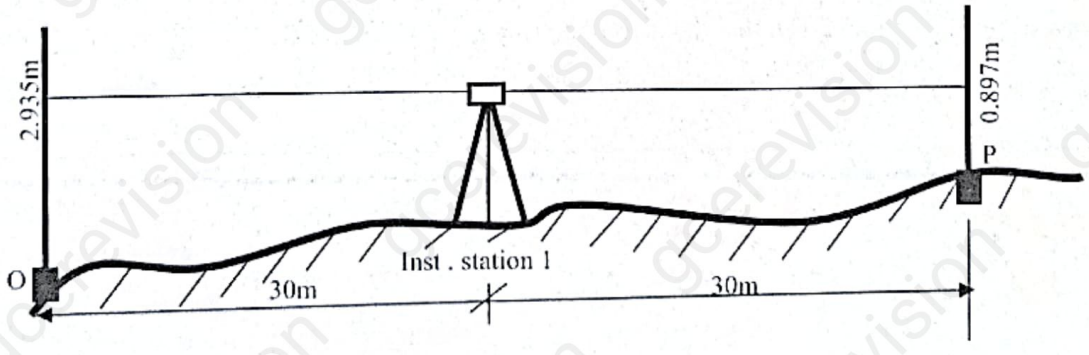


Fig 2

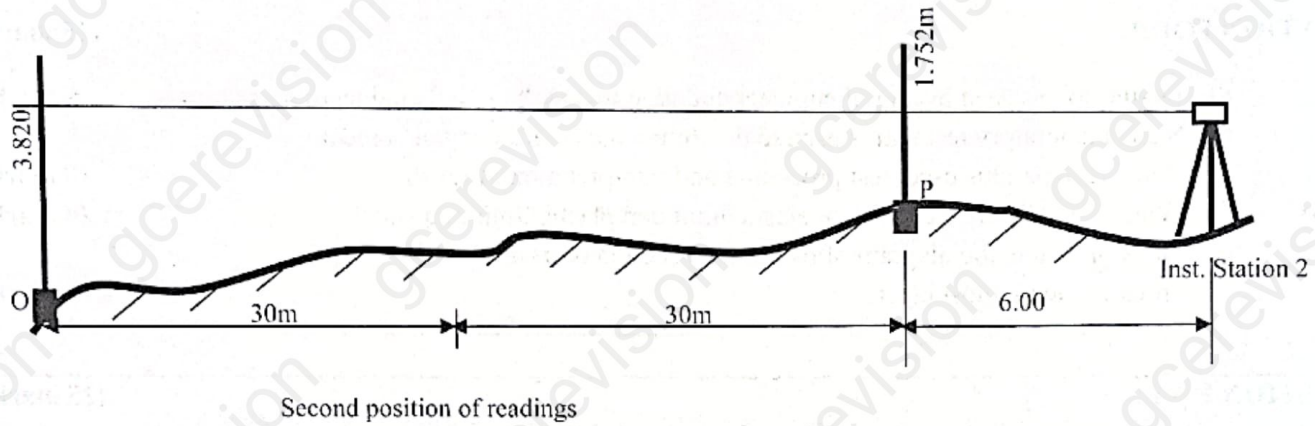
SECTION C: SURVEY (Answer any one question)

QUESTION SIX: **(25 marks)**

a) Define levelling and state the difference between a level line and a horizontal line. **(4 marks)**
b) List the instruments that are widely used in levelling activities. **(3 marks)**
c) A two- peg method was used to control an automatic level. See fig 3 below



First position of readings



Second position of readings

Fig 3

i- Show with calculations if the instrument is in adjustment. **(4 marks)**
ii- Calculate the collimation error per 60m of sight. **(4 marks)**
iii- Calculate the staff reading that should have been read on the staff at **O** when the Instrument was placed 6m away from **P**. **(6 marks)**
iv- Check the correctness of this reading. **(4 marks)**

QUESTIONSEVEN: **(25 marks)**

a) What is the difference between setting up and levelling up a level? **(4 marks)**
b) Below are readings taken during a levelling exercise.

POINTS	BS	IS	FS	RISE	FALL	REDUCED LEVEL	REMARKS
BM	1.32					50.00M	
A	2.56		3.98				
B		1.25					
C		3.65					
D	3.49		0.67				
E		2.58					
F	2.64		1.54				
BM			3.79				

i- Calculate the reduced levels using the rise and fall method of all the points. **(14 marks)**
ii- Calculate the misclosure (error) given that the levelling is closed at the same BM (50.00m) **(4 marks)**
iii- State three causes of errors in levelling. **(3 marks)**
