

**COVENANT UNIVERSITY  
NIGERIA**

*TUTORIAL KIT  
OMEGA SEMESTER*

**PROGRAMME: ESTATE  
MANAGEMENT**

**COURSE: ESM 226**

## **DISCLAIMER**

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# ESM 226: Introduction to Measurement and Description II

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## Question One

The spot levels determined for a plot of land allocated to Mr Oloke by the Cooperative Society is as shown in Figure 1. The grid is at 10 meters interval both ways. You are required to:

- I. Calculate the average spot height for the site
- II. If we assume that the average spot height is equivalent to 15, plot the 15 contour line demarcating area of fill and areas of cut
- III. Calculate the areas of fill
- IV. Calculate the volume of cut
- V. Calculate the volume of fill
- VI. Determine the total area of the land in hectares and in acres
- VII. If the formation level of the imposed structure is given as 22; calculate the volume of cut
- VIII. If the formation level of the imposed structure is given as 22; calculate the volume of fill
- IX. Determine the net fill or the net cut in this circumstance
- X. At what distance are 15 spot heights occurring between XP and ZQ on the plan?

## Question Two

- a. A circular plot of land  $2592 \text{ m}^2$  is being demarcated into standard plot sizes for eventual disposal. If a standard plot measures  $36 \times 18\text{m}$ , how many plots are derivable from the land? Then calculate the diameter of the land and convert the total area to acres.
- b. A cylindrical petroleum product tank with cover, 30m in diameter at the base and 18m high, is to be sand blasted externally and re-painted internally to arrest the current deterioration in terms of corrosion the tank is experiencing. Calculate the area requiring sandblasting and the area requiring painting. What is the total volume of petroleum product the tank can take if allowable filling capacity is 75%.
- c. If a standard plot is currently given as  $36.00\text{m}$  by  $18.00\text{m}$ ; how many of such plots can be derived from six hectares of land?
- d. A triangular piece of land marked ABC has side AB to be 36m, BC to be 45m and CA to be 27m. Calculate the total area of land.

## Question Three

- (a) Of what relevance are contractual documents in construction to the Estate Surveyor and Valuer and where specifically can he make use of them in his day to day business activities?
- (b) Identify and expatiate on the problems that the Course 'Measurement and Description' is trying to address in the built environment.

## Question Four

Arising from the impact of a cataclysmic rainfall, the Septic tank within your Managing Director's compound collapsed and got washed away. This prompted the need for an emergency replacement. A sketch was prepared as shown in Figures 1 to 6 by the Estate Technical Assistant in your organization for

measurement and preparation of bills of quantities. Measure only the earthworks, the concrete works and block works but ignore reinforcement works.

### **Question Five**

The attached survey plan shown as Fig 7 is for a proposed site for Alajeseku Co-operative and Multipurpose Society. The Society is interested in knowing the likely cost of fencing the site to ward off land encroachers. The fence specification is composed of 225 mm thick vibrated sandcrete blockwall in stretcher bond in c:m (1:6), laid straight and plum as work proceeds complete with 225 mm header sandcrete blockwall columns at 3.6 m centre to centre filled solid as work proceeds. The height of the fence is 1.8 metres and it is confirmed that foundation is already in place. Meanwhile your immediate superior would like to have from you the following:

- (a) Total length of the fence to be built
  - (b) The numbers of header columns to be installed
  - (c) The total area of the wall to be built
  - (d) The total number of blocks to be procured if 1 m<sup>2</sup> of blockwall requires 10 blocks to complete it.
- Neglect considerations for any openings. Assist the Society.

### **Question Six**

Measure only the reinforcement complete including the wire mesh required to complete the septic tank in question 1. You still rely on Figures 1 to 6.

### **Question Seven**

With your knowledge of the anatomy of building, present an organogram of building. Of what use is the organogram to a measurer and where can an estate surveyor makes use of it in his business?

### **Question Eight**

Construction works may be classified into three major ones. Identify the three major ones and state the relevant standard method of measurement SMM adoptable in their measurement. Then give five examples of various developments that may fall under each classification. Compare and contrast SMM 6 and BESMM 3 and which would you prefer to measure your work. Give plausible reasons.

### **Question Nine**

Sketch a typical cellular raft foundation and a typical strip foundation and state three types of building where each could conveniently be employed. Then prepare a schedule of measurable items for cellular foundation to guide in its measurement. (20 Marks)

### **Question Ten**

The drawing marked PQ shows the floor plan, the roof plan and its section for a technical drawing room. Relying on your knowledge of building construction, write specification for the elements involved in the pitch roof and take off the roof complete. State all your assumptions before taking off.

### **Introduction**

The plan and the sections attached relate to the substructure of a simple two storey building. The substructure is composed of minimal excavation for stub columns' bases as well as the base for the ground beam. On top of the ground beam sits the 225mm thick sandcrete blockwall filled solid with light concrete (1:4:8) as work proceeds and it is 1000mm high. After the filling, first with 500mm thick laterite compacted in layers, then broken rubbles 500mm high as hardcore and finally, 150mm thick concrete floor slab. All questions relate to the attached drawings.

### **Question Eleven**

Take-off the stub columns only complete ignoring any other element associated with substructure.

### **Question Twelve**

Calculate the volume of the concrete required to complete the ground floor slab otherwise called German floor. Now, a m<sup>3</sup> of concrete (1:2:4 – 19mm aggregate) requires 6 bags of cement 50kg each, 0.45m<sup>3</sup> of sand and 0.9 m<sup>3</sup> of granite chippings; then calculate total number of cement bags required; total volume of sand required and total volume of granite chipping required.

**Question Thirteen**

Having completed questions 1 and 2 above, prepare a bill of quantities incorporating the stub columns and floor finishes schedule arranged in conformity with the structure of SMM you used for the measurement in questions 1 and 2 ignoring preliminary matters like form of agreement, preambles, specifications, conditions of contract and appendix to the conditions of contract.

**Question Fourteen**

Determine the quantity of lateritic and rubble fillings for the substructure. If lateritic filling costs N5,500.00 per m<sup>3</sup> and rubble filling costs N3,500.00 per m<sup>3</sup> delivered to site and labor for dumping and compacting for both is N1,250.00 per m<sup>3</sup>, determine the total amount required to complete the filling and compacting. Filling commences straight on top of existing ground level

**Question Fifteen**

(a). The survey plan of a proposed Nursery and primary school site as shown in diagram P - P was demarcated into grid lines and the spot levels when read were recorded at every grid joint. You are required to:

- i. Calculate the average spot height for the site
- ii. By observation or calculation or both, plot the 20 contour line
- iii. Should the formation level then be 20, calculate the volume of fill
- iv. Should the formation level then be 20, calculate the volume of cut

(b). A triangular piece of land marked ABC has side AB to be 46m, BC to be 25m and CA to be 36m. Calculate the total area of land. There are twenty-four of such lands within a block of land owned by Engr Jimmy George. The owner desires to convert the whole land into standard plots of 36.00m by 18.00m. How many of such plots can he derive from the total land area?

(c). Determine the total surface area of the diagram marked MDD

(d). Determine the volume of the diagram marked MDD

**Question Sixteen**

Measure the pitched roof for the proposed Eating Bay for the drawings Marked C and D. The roof members' details are as specified below. Note that the specification herein might have changed the cross section of the roof as shown, stick to this specification and reconstruct the cross section before measurement either mentally or schematically.

Plate	75 X 100mm sawn hardwood
Ceiling Joist	75 X 100mm sawn hardwood @ 1.2m c/c
Rafter	75 X 100mm sawn hardwood @ 1.2m c/c
Purlins	50 X 75mm sawn hardwood @ 0.9m c/c
Ties	50 X 75mm sawn hardwood @ 0.9m c/c
Struts	50 X 75mm sawn hardwood
King Post	75 X 100mm sawn hardwood; 1.293m high
Fascia Board	25 X 225mm wrot hardwood

Note: All members identified above except Fascia Board are all immersed in solignum anti-termite solution before installation.

Roof covering 0.55 embossed long span aluminium troughed roofing sheet, fixed to timber purlins with aluminium cleats complete with alloy screws; 150mm end laps and two corrugation side laps.

Ridge Cap 0.7 embossed non-troughed aluminium ridge cap; 900mm girth, fixed to timber purlins with aluminium cleats complete with alloy screws and 150mm end laps.

**Question Seventeen**

A perimeter fence is proposed to be erected for Luth Workers Co-operative Society' just acquired land at Shagamu road, Ikorodu, Lagos; for which you are privileged to tender for. If the height of the fence is put at 2.8m, and the survey plan as shown in drawing E is made available to you, determine the area of the fence above ground level. Ignore any likely openings. Ignore any hand written questions on the drawing.

**Question Eighteen**

Measure the staircase complete as shown on the drawing marked KK

**Question Nineteen**

The attached survey plan is for a proposed site for Covenant Co-operative and Multipurpose Society. The Society is interested in knowing the likely cost of fencing the site to ward off land encroachers. The fence specification is composed of 150mm thick vibrated sandcrete blockwall in stretcher bond in c:m (1:6), laid straight and plum as work proceeds complete with 150mm header sandcrete blockwall columns at 3.6 m c/c filled solid as work proceeds. The height of the fence is 1.8 metres and it is confirmed that foundation is already in place. Meanwhile your immediate superior would like to have from you the total length of the fence to be built and the numbers of header columns to be installed to enable him proceed with the estimate. Neglect considerations for any openings. Assist the Society.

**Question Twenty**

Measure the concrete works, the formwork and the reinforcement for beams 1, 2, 3 ,4 and 5 as shown in the drawing marked R.