2425/204
AGRICULTURAL ENGINEERING II
Oct./Nov. 2022
Time: 3 hours

THE KENYA NATIONAL EXAMINATIONS COUNCIL

DIPLOMA IN AGRICULTURE

MODULE II

AGRICULTURAL ENGINEERING II

3 hours

INSTRUCTIONS TO CANDIDATES

You should have the following for this examination:
Answer booklet;
Non-programmable scientific calculator.
Drawing instruments;
SI Metric Psychrometric Chart.
This paper consists of THREE sections; A, B and C.
Answer a total of FIVE questions choosing at least TWO questions from section A, at least ONE question from section B and at least ONE question from section C, in the answer booklet provided.
All questions carry equal marks.
Maximum marks for each part of a question are indicated.
Candidates should answer the questions in English.

This paper consists of 7 printed pages and 1 insert.

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

Turn over

*Answer at least **TWO** questions from this section.*

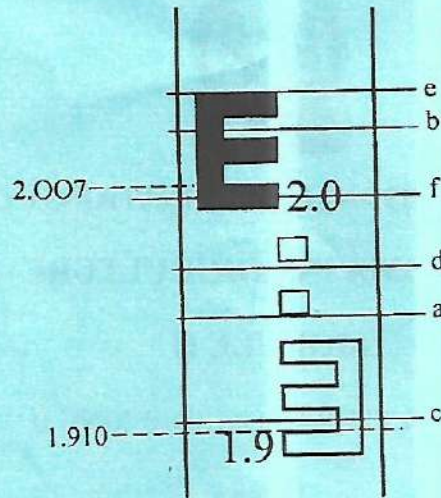1. (a) State the metric staff readings indicated by lines a to f in figure 1.

Fig. 1

(6 marks)

(b) Using diagrams, describe the temporary procedure of centering the telescope bubble of a dumpy level. (6 marks)

(c) Using height of collimation booking method, compute reduced levels of the staff readings in metres illustrated in figure 2 and conduct the arithmetic checks. (8 marks)
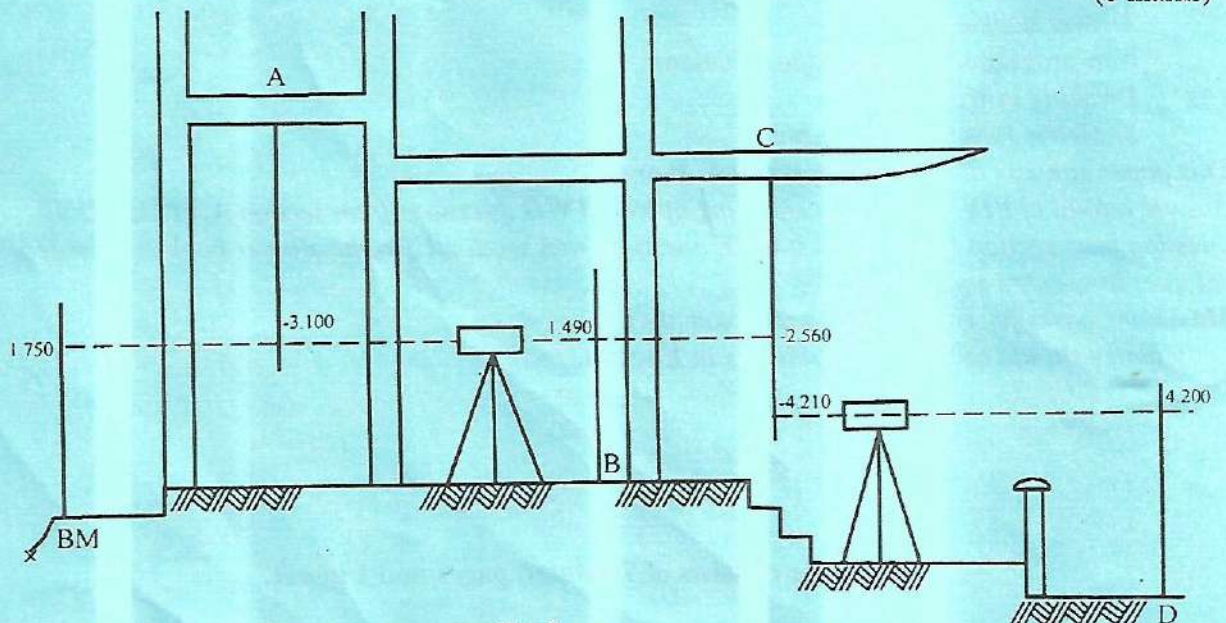

Fig. 2

2. (a) With the aid of a diagram, describe the radiation method of plane tabling. (10 marks)

(b) Using Simpson's rule, calculate the area of land shown in figure 3. The lengths in metres of the perpendicular offsets taken at intervals of 8 m are as indicated. (10 marks)
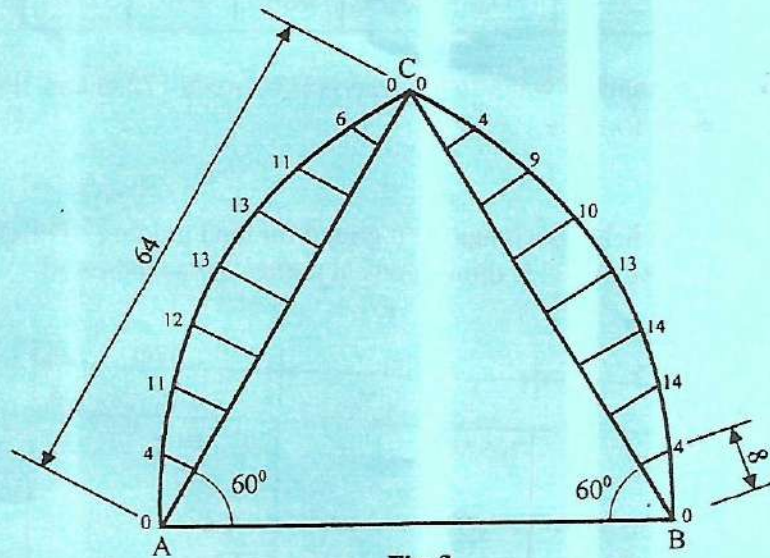

Fig. 3

3. (a) With the aid of a sketch, explain how an obstacle to both chaining and ranging is addressed in chain surveying. (5 marks)

(b) Table I shows a record of field notes from a chain surveying exercise.

Table I

Given that the lengths of the perpendicular offsets and chainage are shown in metres:

(i) sketch the area of the field;

(ii) calculate the area of the field. (15 marks)

4. (a) Table II shows areas within the underwater contour lines of a reservoir.

Table II

Contour (m)	184	182	180	178	176	174	172
Area (m²)	3125	2454	1630	890	223	110	69

Calculate the volume of water in the reservoir between 172 m and 184 m contours using prismoidal formula.

(5 marks)

(b) Figure 4 shows a field which has been grided for land grading. The elevation of the grid points and the grid side dimensions in metres are as indicated.

Fig. 4

If the field is to be graded to a uniform elevation of 200 m, calculate the total volume of cut or fill required.

(15 marks)

SECTION B

Answer at least ONE question from this section.

5.   (a)   Explain **five** factors considered in selecting materials for construction of farm structures.   (10 marks)

(b)   Explain the following terms as applied in concrete technology:

(i)   batching;
(ii)   form work;
(iii) mixing;
(iv)   compaction;
(v)   curing.

(10 marks)

6.   (a)   Draw a floor plan of a zero grazing unit and state **one** function of each compartment.
(10 marks)

(b)   Sketch a longitudinal section of a cattle dip indicating **five** main parts and giving **one** function of any four compartments.
(10 marks)

SECTION C

Answer at least ONE question from this section.

7. (a) Moist air exists at 40 °C dry bulb temperature, 20 °C wet bulb temperature and 101.325 kPa pressure. Using the psychrometric chart provided determine:

    (i) humidity ratio;

    (ii) enthalpy;

    (iii) dew point temperature;

    (iv) relative humidity;

    (v) specific volume.

(10 marks)

NOTE: Attach the used psychrometric chart on the answer booklet.

(b) Using a chart, illustrate the following psychrometric processes:

    (i) sensible cooling only;

    (ii) heating and humidifying;

    (iii) humidifying;

    (iv) evaporative cooling;

    (v) dehumidifying;

(10 marks)

8. (a) With the aid of a labelled diagram, explain the principle of operation of a hair hygrometer. (15 marks)

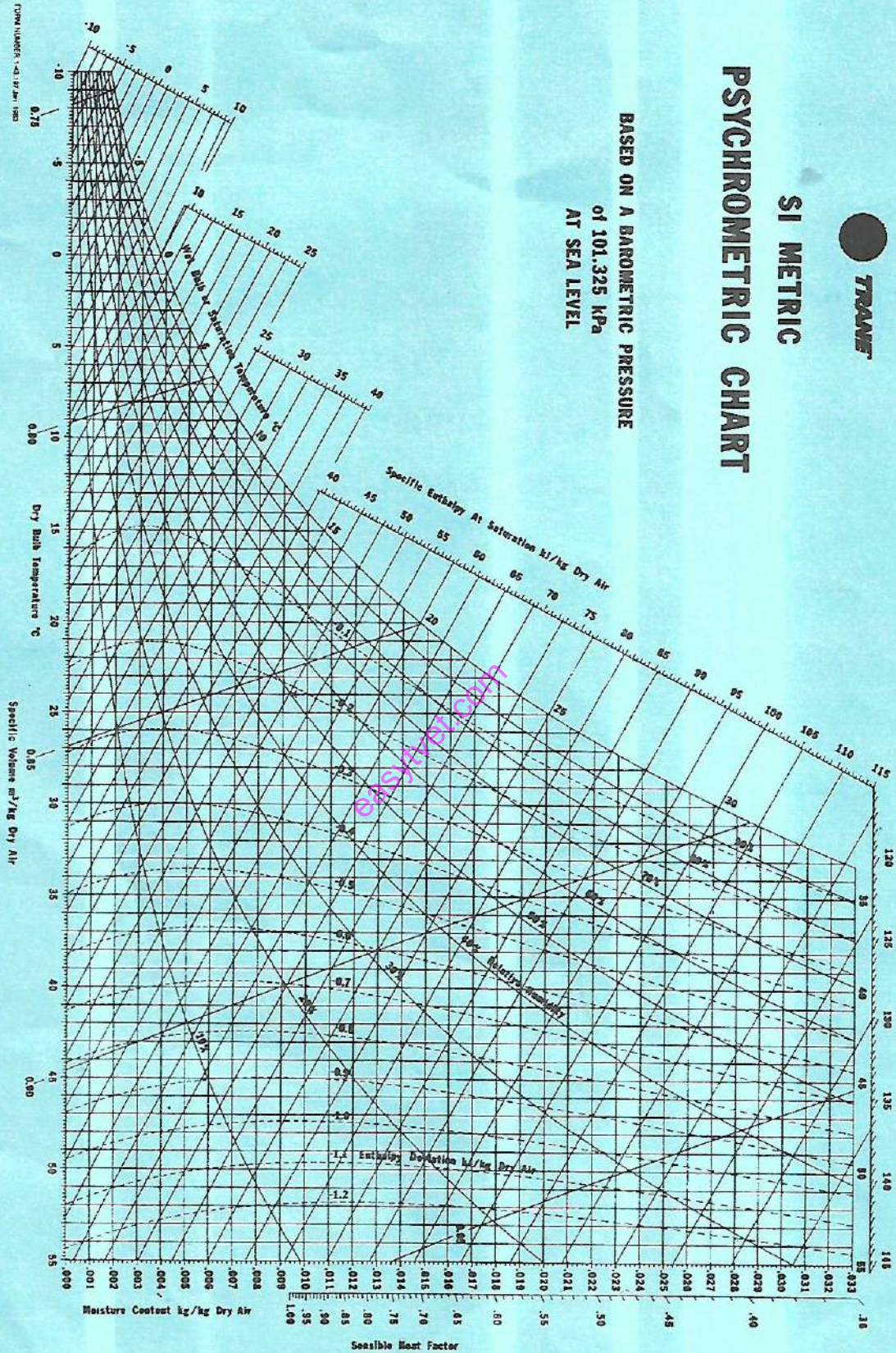(b) Outline **five** advantages of shelling or threshing grains before storage. (5 marks)

SI METRIC PSYCHROMETRIC CHART

BASED ON A BAROMETRIC PRESSURE
of 101.325 kPa
AT SEA LEVEL

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