BINDURA UNIVERSITY OF SCIENCE EDUCATION

FACULTY OF AGRICULTURE AND ENVIRONMENTAL SCIENCE

DEPARTMENT: NATURAL RESOURCES

PROGRAMME: BSc FOREST AND ENVIRONMENTAL MANAGEMENT

NRF 203: FOREST INVENTORY

DURATION: 2 hrs TOTAL MARKS: 70

JUN 2024

INSTRUCTIONS TO CANDIDATES

Answer THREE questions out of the following five questions. You must answer question ONE from SECTION A and any TWO questions from SECTION B.

SECTION A (COMPULSORY)

1. (a) Explain the precautions for measuring:

   i. tree height and [5 Marks]

   ii. tree diameter [5 Marks]

   (b) Distinguish between the following:

   i. Mean annual increment and current annual increment [2 Marks]

   ii. Flexible sampling unit and a fixed sampling unit [2 Marks]

   iii. Forest mensuration and forest inventory [2 Marks]

   iv. Sampling error and non-sampling error [2 Marks]

   v. Taper and form factor [2 Marks]

   (c) Contrast the use of a caliper and a diameter tape for tree diameter measurement. [10 Marks]

SECTION B

2. An inventory was carried for *Pinus patula* in a 5.0 ha stand. Five sampling units were assessed with each sample plot having a radius of 11.3 m. General form factors for the species is 0.43. Below is a summary of the measurements:

Diameter class (cm)	number of trees	Height (m)
23	24	19
25	19	17
27	12	19
29	7	14
31	3	19

Calculate:

i. The sampling intensity used [2 Marks]

ii. Average dbh using Squaring method [5 Marks]

ii. Basal area/ha [4 Marks]

iii. Volume/ha [5 Marks]

iv. Dominant height [4 Marks]

3. Discuss the components of a forest inventory plan. [20 Marks]

4. (a) Determine the heights of the following trees using the shadow method. [10 Marks]

Tree number	Stick length (m)	Stick shadow (m)	Tree shadow (m)
1	2	4	8
2	6	7	12
3	3	2.3	7
4	2.5	1.5	6
5	1.7	2.5	4.4

(b) Explain how you convert a stack of logs to solid volume given the following logs in a stack of firewood measuring 1.2m x 2.0m x 1.8m and individual logs had the following butt (D), mid (m) and small (d) diameters. What is the conversion factor? [10 Marks]

No of logs	D (cm)	m (cm)	d (cm)	Length (m)
12	34	30	29	1.2
9	34	29	26	1.2
10	32	30	27	1.2
15	31	30	25	1.2
6	28	25	24	1.2

5. (a) Discuss the emergence of REDD+ in African and explain the role of forest measurement in mitigating climate studies. **[10 Marks]**

   (b) Give an outline of form factor determination for specific tree species. **[10 Marks]**