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 முழுப் பதிப்பரிமையடையது]
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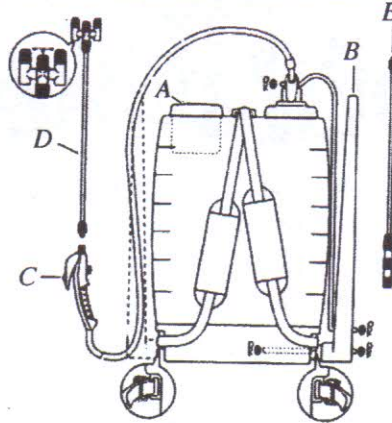
Open Competitive Examination for Recruitment to the Post of Farm Manager,
 Extension Officer and Technological Officer of Class III of
 Sri Lanka Technological Service for the
 Department of Export Agriculture – 2015 (2016)

(03) General Test II
 (Technological and Subject affiliated Test)

Three hours

● Answer all questions.

1. (i) (a) Define the term LD_{50} of a pesticide.
 (b) State **five** different groups of herbicides according to their mode of action.
 (c) State **four** types of formulations of pesticides available in the market.
 (d) State **five** essential information that should be indicated in a pesticide label.
- (ii) (a) Label the parts A to E in a Knapsack sprayer given in the diagram.



- (b) State **five** key factors that a farmer should consider when purchasing a Knapsack sprayer.
 (c) A farmer would like to spray herbicides for a 2.5 h of land with a 15 l capacity Knapsack sprayer. State **five** important parameters that should be considered when calibrating the Knapsack sprayer.
 (d) Calculate the number of sprayer tanks (Knapsack Sprayer; 15 l capacity) that should be used to apply a pesticide for the above land given in part ii (c). (Consider that the pesticide is applied at the rate of 100 g/ha and the spray volume is 180 litres/ha.)
- (iii) (a) Botanical names of few commonly found weeds are given below.

Mimosa pigra, *Echinochloa crusgalli*, *Cyperus iria*, *Eichnornia crassipes*, *Ageratum conyzoides*
 Classify the given weeds into suitable categories identified in the Table. (Copy the table to the answer script)

| Category | Weed(s) |
|----------------|---------|
| Sedge | |
| Aquatic | |
| Invasive alien | |
| Grass | |
| Broad leaf | |

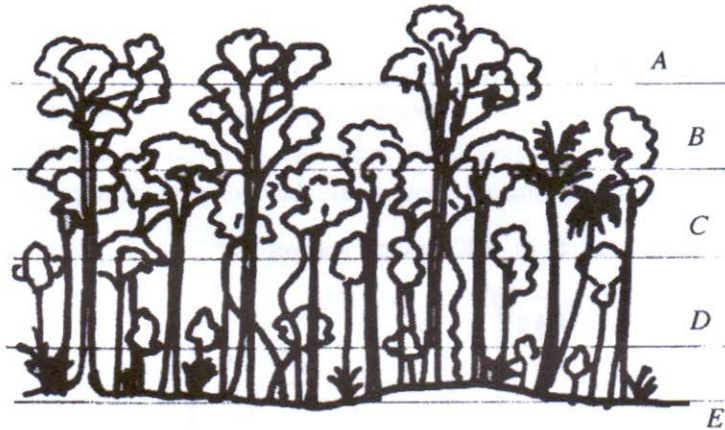
- (b) State **five** agronomic practices that can be used to control weeds in upland crops.

(c) List the main causative agents of the following plant diseases. (Copy the table to the answer script)

| Plant disease | Causative agent |
|---------------------------|-----------------|
| Banana bunchy top disease | |
| Leaf blight in rice | |
| Soft rot in carrot | |
| Blister blight in tea | |

(d) State **three** major symptoms of Coconut mite (*Aceria guerreronis*) attack.

2. (i) (a) A sketch diagram illustrating layers in the Sinharaja evergreen forest in Sri Lanka is shown below. Name the layers A to E.

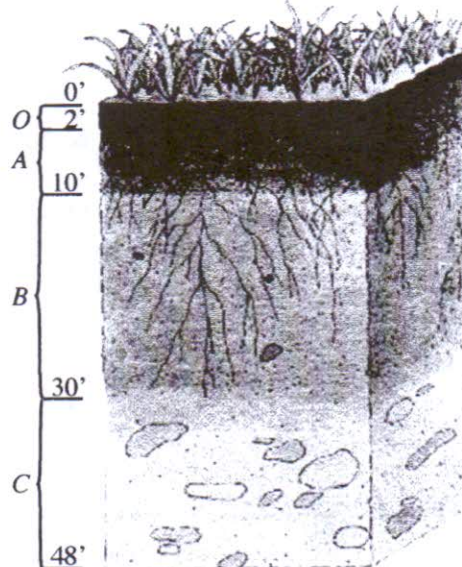


(b) State **one** endemic plant species that can be found in each of the layers A, B, C of the Sinharaja forest identified in the sketch.

(c) Briefly explain the term 'Gross Primary Productivity'.

(d) List **three** main gases that could contribute to greenhouse effect.

(ii) A vertical section of the soil (soil profile) that is exposed when a soil pit, or hole, is dug from the surface is given below.



(a) Identify the soil horizons and complete the following table. (Copy the table to the answer script)

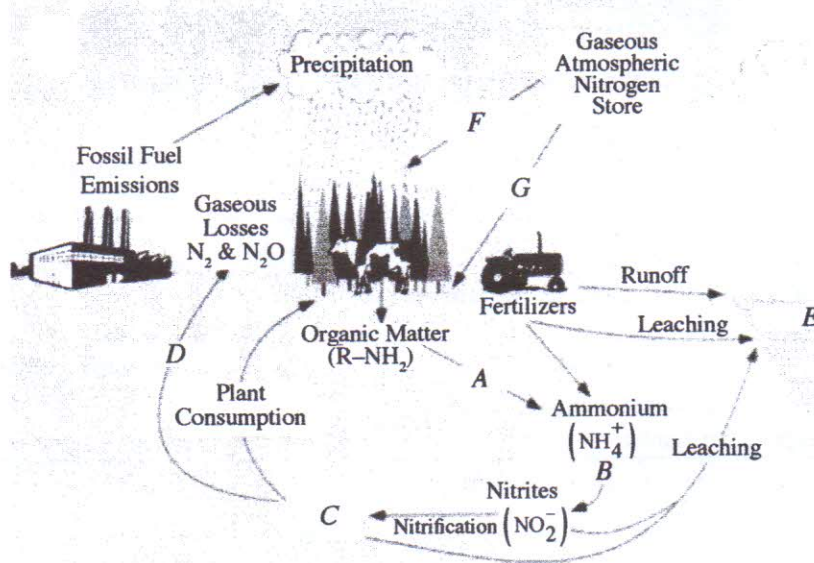
| Soil Horizon | Common Name | Relative Acidity |
|--------------|-------------|------------------|
| O | | |
| A | | |
| B | | |
| C | | |

- (b) What are the soil horizon(s) that contain organic matter? (Use the letters *O, A, B, C* for your answer)
- (c) What is the soil horizon that contains the zone of acclimation? (Use the letters *O, A, B, C* for your answer)
- (d) Copy the following table to the answer script and complete it in relation to the properties of three common soil types found in Sri Lanka. State the answer using high (*H*), moderate (*M*) and low (*L*) as indicators.

| Characteristic | Soil Type | | |
|----------------|-----------|-------|--------|
| | Sandy | Loamy | Clayey |
| Water storage | | | |
| Aeration | | | |
| Surface Area | | | |
| Infiltration | | | |

- (e) State examples of **five** types of colloidal materials present in the soil.
- (iii) A sample of moist soil having a wet mass of 1000 g and a volume of 650 cm³ was oven dried; and had a dry mass of 800 g. Assume that the typical particle density of mineral soil is 2.65 g cm⁻³. Calculate the followings:
 - (a) Dry matter percentage
 - (b) Bulk density
 - (c) Porosity
 - (d) Void ratio

3. (i) The following diagram illustrates the Nitrogen cycle which represents one of the most important nutrient cycles found in the terrestrial ecosystems.

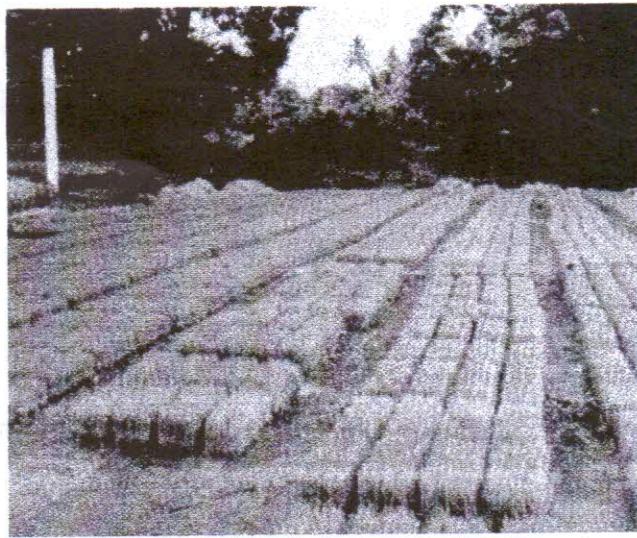


- (a) Identify the processes indicated as *A, B* and *D*.
- (b) What is the nature of the chemical group indicated as *C*?
- (c) List **two** important processes involved in fixing atmospheric nitrogen at *F* and *G*.
- (d) State **two** negative consequences that could cause to aquatic fauna due to the process "*E*".
- (e) State **two** activities of humans that have severely altered the nitrogen cycle and enhance the process "*E*".

- (ii) (a) Copy the following table to the answer script and complete it in relation to three commonly cultivated rice varieties in Sri Lanka.

| Rice Variety | Age of the variety (months) | Presence of Awns (Nonduwa)– (Yes / No) | Colour of the rice grain (red / white) |
|--------------|-----------------------------|--|--|
| Bg 362 | | | |
| At 353 | | | |
| Ld 356 | | | |

- (b) State **four** major factors that affect the choice of the method of field establishment of rice.
- (c) A method commonly used for making rice nurseries is shown in the figure given below. Identify this method.

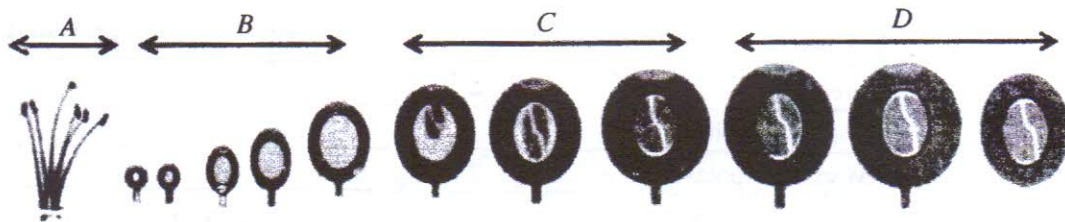


- (d) State **four** advantages of the method mentioned above (ii)(c) compared to other paddy establishment methods.
- (e) State **three** important benefits that could be obtained by micro propagation of plants.
- (iii) (a) What is “green curing” in relation to post harvest handling of cardamom?
- (b) Complete the following table with appropriate information in relation to Cinnamon. (*Cinnamomum zeylanicum*). (Copy the table to the answer script)

| Description | Appropriate name / term |
|---|-------------------------|
| The best sweet–pungent cinnamon type in Sri Lanka | |
| Major chemical substance in cinnamon bark oil | |
| The best grade cinnamon produced in Sri Lanka | |

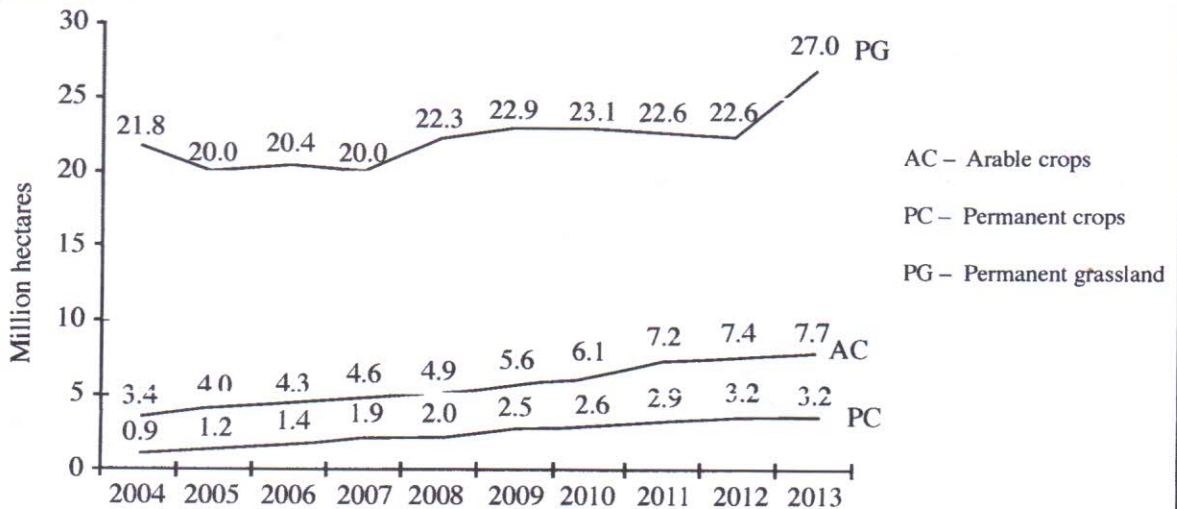
- (c) State **two** most important crop management practices that need to be carried out for black pepper plants.

(d) A sketch diagram to show the fruit development in coffee (*Coffea arabica*) is given below. Name the phases A to D.



(e) State **two** major changes that take place in *Coffea arabica* beans during phases B to D identified in (iii)(d) above.

4. (i) Development of the organic land use type from 2004–2013 in the world is shown in the graph given below.



(a) Using the above figure, state **three** trends that could be observed in relation to organic land usage in the world.

(b) List **three** major differences between organic farming and conventional farming of vegetables.

(ii) (a) State **two** important functions of potassium in plants.

(b) List the **two** main forms of nitrogen absorbed by plants.

(c) Some Macronutrient deficiency symptoms of plants are indicated in the table given below. Name the respective macronutrient deficient for each description. (Copy the table to the answer script)

| Description | Macronutrient deficient |
|--|-------------------------|
| New leaves (top of plant) are distorted or irregularly shaped. Causes blossom-end rot. | |
| Older leaves turn yellow at edge leaving a green arrowhead shape in the center of the leaf. | |
| Leaf tips look burnt, followed by older leaves turning a dark green or reddish purple. | |
| General yellowing of older leaves (bottom of plant). The rest of the plant is often light green. | |

(d) Bases present in a part of a DNA strand is given below. State the bases present in the complementary strand in the correct order.

GAT CAT ACT TAG CAG

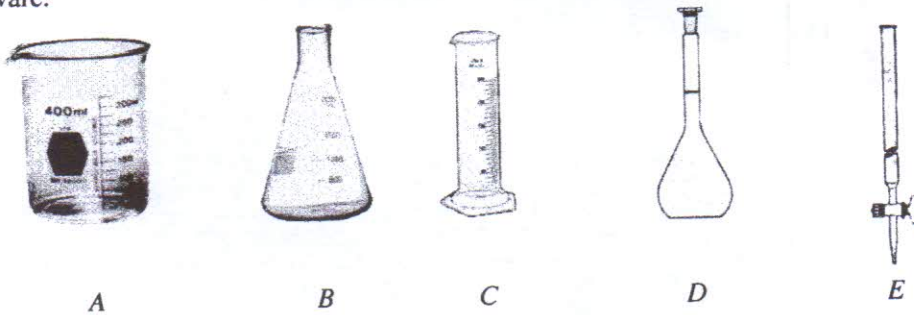
(e) State the major nutrient and its content (%) in each of the following fertilizers. (Copy the table to the answer script)

| Fertilizer | Major nutrient and percentage |
|-----------------------|-------------------------------|
| Urea | |
| Triple superphosphate | |
| Muriate of potash | |
| Ammonium sulfate | |

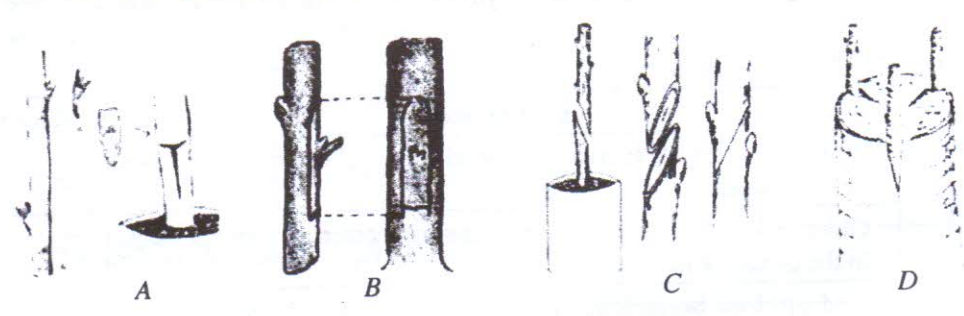
(iii) Some of the commonly used laboratory chemicals are given below.
 Concentrated sulfuric acid, Sodium hydroxide pellets, Silver nitrate, Ethanol,
 Formaldehyde, Diethyl ether, Chloroform, Copper sulfate granules
 Answer the questions (iii) (a) to (iii) (d).

- (a) Chemicals most likely to cause a penetrating burn, but little initial pain upon exposure to skin
- (b) Chemicals that should only be used in a laboratory fume hood
- (c) Chemicals that will cause immediate pain and burning
- (d) Chemicals that will cause significant fire hazard

(iv) Identify the laboratory glassware indicated from A to E and state one main laboratory use of each of the glassware.

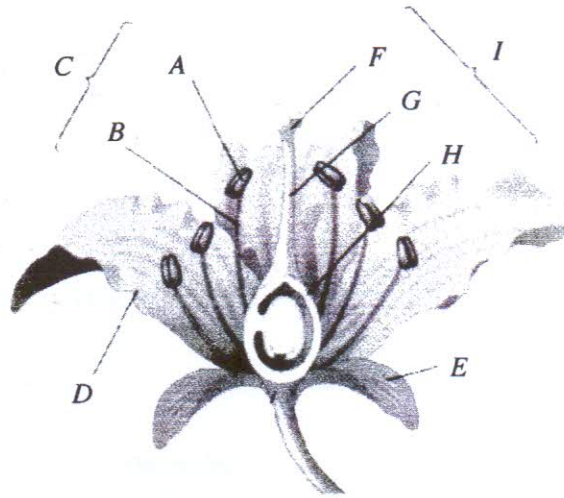


5. (i) (a) State the major differences between sexual propagation (seeds) and asexual propagation (cuttings)?
- (b) State the differences between the scion and rootstock in relation to vegetative propagation of plants.
- (c) List **five** asexual root propagation methods commonly used for fruit plants.
- (d) Name the different grafting methods shown the plate given below. (A - D)



- (ii) (a) Define "gully erosion".
- (b) List **five** main factors that influence the vulnerability of a field to soil erosion.
- (c) State **four** wind erosion control methods commonly used for soil conservation.
- (d) Name **three** modern irrigation methods that could minimize soil erosion.

(iii) (a) Name the different parts A to I of an angiosperm flower given below.



(b) State **four** important characteristics of flowers that are adopted for cross pollination.

(c) Name a chemical test which is commonly used for checking the viability of seeds and state the **four** main steps of the test.

(d) List **four** physical quality standards that are measured in seeds during certification process.

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