

# SLIATE

SRI LANKA INSTITUTE OF ADVANCED TECHNOLOGICAL EDUCATION

(Established in the Ministry of Higher Education, vide in Act No. 29 of 1995)

## Higher National Diploma in Technology (Agriculture)

First Year, Second Semester Examination – 2016

### AG 1207: Agricultural Implements and Machines

**Instructions for Candidates:**

There are three parts (I, II, III).

Answer all questions.

Answer Part I and Part II on the paper itself.

Part I and Part II will be collected after **one (01)** hour.

All questions do not carry equal marks.

**Index No:** .....

No. of pages : 07

No. of questions : 07

Time : **Three (03) hours**

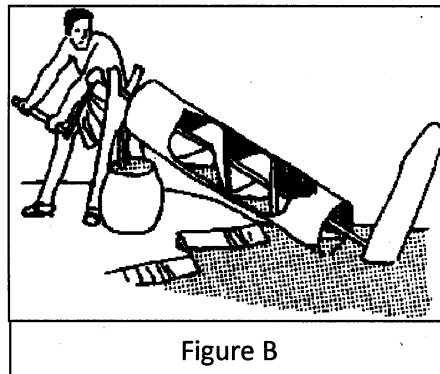
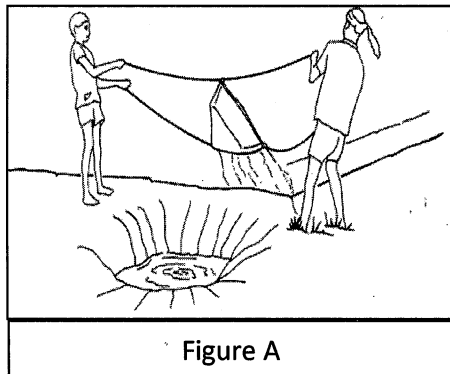
### Part I

**Question 01:**

Select the most appropriate answer and circle it on this paper.

- (i) Breaking and loosening of undisturbed soil up to 36 inches and forming big soil clods is named as,
- a) Inter tillage
  - b) Primary tillage
  - c) Secondary tillage
  - d) None of above
- (ii) Select the **correct** statement regarding patterns of crop establishment in the field.
- a) Dropping seeds in the rows over the area is called row transplanting.
  - b) Dropping seeds in random over the land is called random transplanting.
  - c) Dropping seeds uniformly in furrows is called broadcasting.
  - d) Dropping a seed or few seeds in a hall and covering is called as dibbling.
- (iii) Select the **correct** statement/s regarding manually operated weeder.
- 1. Smooth and serrated blades are mounted alternately on the rotor for operation.
  - 2. It can be used in both types of fields where row seeding and broadcasting applied.
  - 3. Rotor create a back and forth movement in order to uproot and burry weeds.
- a) Statements 1 and 2 are correct.
  - b) Statements 2 and 3 are correct.
  - c) Statements 1 and 3 are correct.
  - d) All the statements are correct.

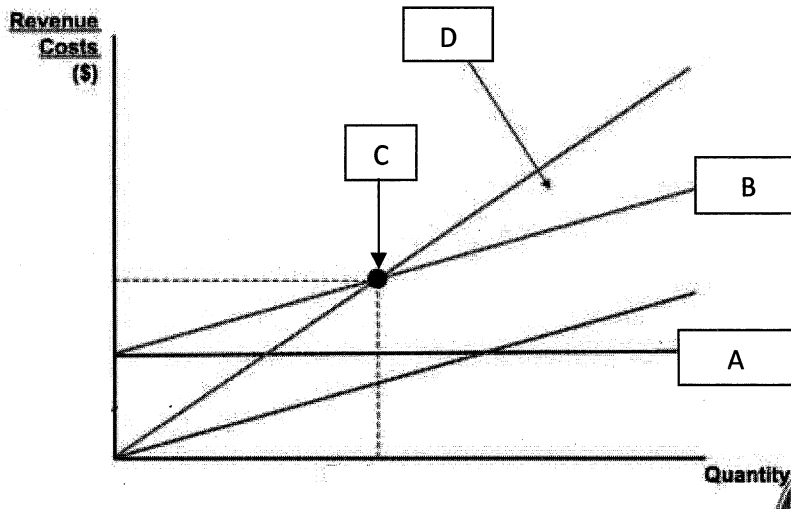
- (iv) Two water lifting devices are given in figure A and B. Water lifting devices shown in figure A and B are respectively,



- a) Swing basket and Archimedean screw  
b) Don and Archimedean screw  
c) Counterpoise lift and Paddle wheel  
d) Don and Persian wheel
- (v) Select the correct statement/s regarding the deep well reciprocating pumps.
1. Water which is on the top of the discharge valve moves out with up-ward movement of plunger
  2. Pump cylinder is placed beneath the water.
  3. Piston is connected to the pump handle or crank shaft
- a) Only the statement 2 is correct  
b) Statement 2 and 3 are correct  
c) Statement 1 and 2 are correct  
d) All the statements are correct
- (vi) A reciprocating/ piston pump is used to lift water from a well. Inner radius of the pump cylinder is 7 cm. If the length of one stroke is 2m, the swept volume for the above stroke is,
- a) 61600 cm<sup>3</sup>  
b) 30800 cm<sup>3</sup>  
c) 8800 cm<sup>3</sup>  
d) 4400 cm<sup>3</sup>
- (vii) A piston pump type knapsack sprayer,
- a) Is more suitable in applying herbicides, than insecticides.  
b) Generates pressure up to 15 bars.  
c) Is much more efficient than diaphragm pump type.  
d) Is used where bigger droplets are required.

- (viii) Select the **incorrect** statement regarding power dusters.
- Power duster of small capacity is generally mounted on the back of the operator.
  - Air pressure is utilized to agitate the dust in the container in order to blow it through the flexible hose pipe.
  - Dust can be blown up to about 6 meters height.
  - Cylindrical container is provided with three compartments; one for gasoline, one for water and the other for the powder to be dusted.
- (ix) Correct indicator for detecting the proper time for harvesting of paddy is,
- 80-85% straw color in the crop
  - 14% grain moisture
  - 45 days after flowering
  - 40 days after flowering
- (x) Select the **correct** statement regarding grass mowers.
- Mounted type cutter contains a back pack power unit and a long handle supported by a shoulder belt.
  - In the case of conventional reciprocating type mower, the cutting mechanism is driven independently of the forward speed of the mower.
  - Rotary mower cannot be used for weeding under trees due to its larger size.
  - In knapsack type grass mowers, a V pulley rotates another smaller pulley on the crank shaft of the machine for power transmission.
- (xi) A medium size bullock develops,
- |                          |                           |
|--------------------------|---------------------------|
| a) Between 0.1 to 0.4 hp | b) Between 0.5 to 0.75 hp |
| c) Between 0.8 to 1.0 hp | d) Between 1.0 to 1.4 hp  |
- (xii) Compression ratio of a diesel engine varies from,
- |                 |                 |
|-----------------|-----------------|
| a) 4:1 to 8:1   | b) 10:1 to 12:1 |
| c) 14:1 to 20:1 | d) 22:1 to 24:1 |
- (xiii) A four wheel tractor mounted disk harrow is ready for the operation in the field. Force required to pull the harrow is 3750 lb. If the ground speed of the harrow and the tractor is 15 mph and the constant value for the tractor is 375 respectively,  
Drawbar power required to move the harrow is,
- |           |            |
|-----------|------------|
| a) 150 hp | b) 1500 hp |
| c) 15 hp  | d) 1.5 hp  |
- (xiv) Select the mobile power source, from the list given below.
- Petrol engine
  - Draft animals
  - Bio gas
  - Electricity from main line

- (xv) Below graph shows a break-even analysis carried out in a farm. Mentioned A, B, C and D are respectively,



- a) Fixed cost, Total cost, Break-even point, Profit  
 b) Fixed cost, variable cost, Break-even point, Profit  
 c) Fixed cost, Total cost, Break-even quantity, Loss  
 d) Total cost, variable cost, Break-even revenue, Loss
- (xvi) A self propelled implement is,

- a) Reaper  
 b) Disk plough  
 c) Tine tiller  
 d) Mechanical trans planter

**(Total 16 marks)**

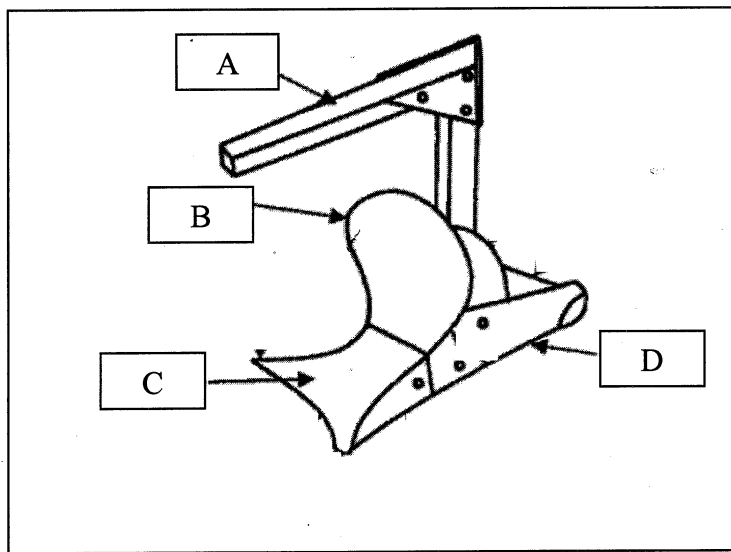
**PART - II**

**Question 02:**

(i) Name four (04) types of secondary tillage implements.

.....  
.....  
.....  
..... (04 marks)

(ii) Below figure shows a mould board plough. Name the parts A, B, C and D.



A - .....  
B - .....  
C - .....  
D - ..... (04 marks)

(iii) State four (04) advantages of disk plough, when compare it with the mould board plough.

.....  
.....  
.....  
..... (04 marks)

**(Total 12 marks)**

**Question 03:**

(i) Define sprayer

.....  
.....(02 marks)

(ii) List three (3) liquid breaking mechanisms

.....  
.....  
.....(03 marks)

(iii) The tractor mounted sprayer moves at rate of 6 Km/hr. in a green gram field to control some fungal attack. The boom of the tractor is 2m long, and total nozzle discharge is 2 L/min. If land area is 2ha. Compute.

a) Required time to cover total land area.

.....  
.....  
..... (03 marks)

b) Required solution for total land area.

.....  
.....  
..... (04 marks)

**(Total 12 marks)**

### PART III

#### Question 04:

- (i) List four (4) types impellers. (04 marks)
- (ii) Differentiate Self-priming and Non self-priming pumps. (05 marks)
- (iii) Briefly explain the working principle of **single acting** reciprocating piston pumps, with sketch diagrams. (06 marks)

**(Total 15 marks)**

#### Question 05:

- (i) Write usage of duster (02 marks)
- (ii) Explain the points considered in care and maintenance of a duster. (04 marks)
- (iii) Briefly explain the working principle of “Diaphragm” type knapsack sprayer (09 marks)

**(Total 15 marks)**

#### Question 06:

- (i) List three (3) paddy harvesting methods are practiced in Sri Lanka. (03 marks)
- (ii) State the advantages and disadvantages of “Manual cutting” of paddy. (05 marks)
- (iii) Explain the process involved in multistage milling of paddy. (07 marks)

**(Total 15 marks)**

#### Question 07:

- (i) A disk plough was purchased to the ATI farm for a price of Rs. 12000. Economic life of the plough is 10 years. If the salvage value is Rs. 6000, figure-out the annual depreciation of the plough. (03 marks)
- (ii) Briefly discuss the ways of improving productivity through mechanization, in the field of agriculture. (06 marks)
- (iii) Briefly explain the machinery hazards that can be happened in a farm. (06 marks)

**(Total 15 marks)**