



The Open University of Sri Lanka
Faculty of Engineering Technology
Industrial Studies Program
Final Examination 2007
AEI 5243 Farm Power and Machinery

Date : 22-04-2008
Time : 0930-1230 hrs

SECTION 2

Answer any four (4) questions. All questions carry equal marks.

Q1. A rear axle of a tractor carries a load of 2000kg. Using a following given information and equations, calculate the,

- (a) Contact patch area
- (b) Maximum gross thrust(H_m)
- (c) Thrust at 15% wheel slip?

Assume that tyre size is 13.6/ 12-38

bc, Section width=13.6"
h, section height = 12"
dr, rim diameter = 38"

(Each value in tyre size notation is given in inches)

Soil values: Cohesion of soil(C) = 10 kN /m²
Angle of shearing resistance, $\phi = 25^\circ$
Deformation modules, $k = 15\text{mm}$

The following formulae could be used with usual notation.

$$H_m = AC + \omega \text{Tan}\phi$$

$$\frac{H}{H_m} = 1 - \frac{1 - e^{-j_k}}{j_k} \quad j_k = sl/k$$

$$b = 0.87bc$$

$$l = 0.31dc$$

$$dc = dr + 2h$$

Q2. A weight of a saturated clay soil sample was 1725g and 1085g after drying. If the specific gravity of the soil is 2.65, calculate the following values.

- (a) Moisture content of the soil sample
- (b) Void ratio
- (c) Porosity of soil
- (d) Bulk density of the soil sample



- Q3. Sri Lanka is a potential country of generating energy from natural resources. Write an essay on that. Illustrate your answer using the geographical location of the country and availability of natural resources in the country.
- Q4. (a) Briefly explain how you obtain peak efficiency from human labour?
(b) Write a summary account on marginal benefits of animal power versus human labour?
(c) List out primary and secondary tillage implements separately.
- Q5. Briefly describe why mechanization is needed in highland crop cultivation with suitable examples in Sri Lanka?
- Q6. (a) Briefly write on the necessity of seed cleaning.
(b) Briefly describe cleaning principles used in air screening machine used for basic cleaning of seeds.
(c) What is meant by precision cleaning of seeds?