B. Tech.
(SEM. VII) ODD SEMESTER THEORY
EXAMINATION 2012–13
MECHANICS OF TILLAGE AND TRACTION

Time : 3 Hours
Total Marks : 100

Note :
(1) Attempt all questions.
(2) Each question have equal marks.
(3) Assume necessary data.

1. Attempt any four parts : (5×4=20)
   (a) Describe the term tillage. Also write down the objective of tillage.
   (b) Define the following terms :
       (i) Specific draft
       (ii) Drawbar power
       (iii) Kilowatt hours
       (iv) Side draft
       (v) Stress and strain.
   (c) What is the effect of the speed upon draft? With formula.
   (d) Define the minimum tillage system. With objective.
(e) The line of pull on an implement is 17° above the horizontal and is in a vertical plane which is at an angle of 12° with the direction of travel.
   (i) Calculate the draft and side draft force for a pull of 15 kN.
   (ii) What drawbar power would be required at 5 km/hr?
(f) What is the relation between soil metal friction and soil moisture content?

2. Attempt any four parts:
   (5×4=20)
   (a) What factor effect the designing of tillage tools?
   (b) What forces are acting upon tillage tools? With formula also write down the symbol used in formula.
   (c) What is hitching system with their types?
   (d) What do you understand by tillage method with neat sketch?
   (e) What is the effect on the rotavator use in the dry land?
   (f) What is the affect of the curvature of the mould board in draft?

3. Attempt any two parts:
   (10×2=20)
   (a) How much energy is required for soil breakup? Describe with suitable graph.
   (b) What do you understand by Bin? Also describe types of the Bin.
   (c) A traction wheel having 600 mm diameter was tested in soil bin and following data were recorded:
      Angular speed of wheel = 10 rpm
      Input torque to wheel Axel = 60 Nm
      Drawbar pull = 150 N
      Normal load on wheel axel = 500 N
      Wheel forward speed = 0.25 m/s
      Compute:
      (i) Co-efficient of traction
      (ii) Wheel slippage
      (iii) Ttractive efficiency.

4. Attempt any two parts:
   (10×2=20)
   (a) What is the relation between tire size and air pressure relation slip?
   (b) What do you understand by Traction Improvement?
   (c) A two wheel drive 35 Hp tractor has 1.5 m rear wheel diameter. The engine runs at 1200 rpm. The total reduction of speed is 30 : 1, find the traveling speed of the tractor in km/hr and tractive force for each driving wheel.

5. Attempt any two parts:
   (10×2=20)
   (a) What factors are used for testing of tire?
   (b) What is blasting and also discuss the types of blasting?
   (c) Predict the maximum traction thrust of a track type tractor with two track each 360 mm wide by 1680 mm long, the weight of the tractor is 31.75 kN. Assume the lugs on the track are such that the soil is sheared off in a plow area at the end of the lugs soil parameter are C = 14 kPa and \( \varphi = 30° \).