

<b>5<sup>th</sup> Semester</b>	<b>RAG5D005</b>	<b>Mechanics of Tillage and Traction</b>	<b>L-T-P 3-0-0</b>	<b>3 CREDITS</b>
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### **Module I (10 hours)**

Introduction - meaning and application of the course, Soil- definition, formation of soil and Importance of soil; Physical properties of soil, soil structure, soil texture, classification of soil; Soil moisture – concepts, terms related to soil m.c., field capacity, wilting point, available water; Meaning of dynamic properties of soil, types of dynamic properties of soil-Strength, shear, tension, compression, plastic flow,

friction, adhesion, abrasion and their measurement; Stresses in soil, principal stresses in soil, stress-strain relationship in soil

### **Module II (10 hours)**

Mechanics of tillage tools-draft, normal load, acceleration force, specific resistance; Principles of design of tillage tools, design equation; Introduction to dimensional analysis, variables related to soil – tyre system; Dimensional analysis of different variables related to soil tyre system, mobility number

### **Module III (10 hours)**

Introduction to traction devices, tyre - types, function and size, lug geometry of tyre and their effect; Tyre selection and tyre testing; Mechanics of traction device, Traction, tractive force, drawbar pull, towing force, tractive efficiency, net traction co-efficient; Operational status of wheels-towed wheel, self-propelled wheel, driving wheel, braked wheel. traction improvement; Determination of rolling resistance of pneumatic wheel

### **Module IV (10 hours)**

Soil compaction by agricultural vehicles and machines and its effect on crop growth; Soil variability, application of GIS for assessment of soil variability

#### **Books**

1. Gill and Vandenberg.1968. Soil Dynamics in Tillage and Traction. Agricultural Research Service, USDA, Govt. Printing Press, Washington, D.C.
2. Macmillan, R.H.2002. The Mechanics of Tractor-Implement Performance. International Development Technologies Centre, University of Melbourne.
3. Terzaghi, K and P. Ralph B. 1967. Soil Mechanics in Engineering Practices. John Willey & Sons.
4. ASAE Distinguished Lecture series on Tillage and Traction

#### **Digital Learning Resources**

1. FAO Soil portal <http://www.fao.org/soils-portal/soil-survey/soil-properties/physical-properties/en/>
2. [ftp://ftp.fao.org/fi/cdrom/fao\\_training/fao\\_training/general/x6706e/x6706e08.htm](ftp://ftp.fao.org/fi/cdrom/fao_training/fao_training/general/x6706e/x6706e08.htm)