

## 22ELCT303 TRACTOR DESIGN AND TESTING

Hours Per Week :

L	T	P	C
2	0	2	3

**PREREQUISITE KNOWLEDGE:** Design procedure of tractor and design parameters of tractor stability and weight distribution, Traction, hitching system and hydraulic lift system, Design of power transmission, steering of Tractor, Design of engine and material selection, Tractor seat and control and tractor testing

### COURSE DESCRIPTION AND OBJECTIVES:

The objective of this course is to equip the students with the design procedures of tractor systems and testing procedures.

### MODULE-1

#### UNIT-1

8L+0T+8P=16 Hours

#### DESIGN PROCEDURE OF TRACTOR AND DESIGN PARAMETERS OF TRACTOR STABILITY AND WEIGHT DISTRIBUTION:

Procedure for design and development of agricultural tractor. Study of parameters for balanced design of tractor for stability & weight distribution.

#### UNIT-2

8L+0T+8P=16 Hours

#### TRACTION, HITCHING SYSTEM, HYDRAULIC LIFT SYSTEM AND DESIGN OF POWER TRANSMISSION:

Traction theory, hydraulic lift and hitch system design. Design of mechanical power transmission in agricultural tractors: single disc, multi disc and cone clutches. Rolling friction and anti-friction bearings

#### PRACTICES:

- Design and selection of hydraulic pump.
- Design problem of tractor clutch – (Single/ Multiple disc clutch).
- Design of gear box (synchromesh/constant mesh), variable speed constant mesh drive.

### MODULE-2

#### UNIT - 1

8L+0T+8P=16 Hours

#### STEERING OF TRACTOR AND DESIGN OF ENGINE AND MATERIAL SELECTION:

Design of Ackerman Steering and tractor hydraulic steering. Study of special design features of tractor engines and their selection viz. cylinder, piston, piston pin, crankshaft, etc.

#### UNIT - 2

8L+0T+8P=16 Hours

#### DESIGN OF ENGINE AND MATERIAL SELECTION, TRACTOR SEAT AND CONTROL AND TRACTOR TESTING:

Design of seat and controls of an agricultural tractor. Tractor Testing.

**Tractor**



Source : [https://lh3.googleusercontent.com/oUTwGje8c5Q\\_iSDKclFsordWNY6iWZVu8\\_7CqUQG8J4PXZ9CTxbdvkjUForn-9QaVurdwQ=s151](https://lh3.googleusercontent.com/oUTwGje8c5Q_iSDKclFsordWNY6iWZVu8_7CqUQG8J4PXZ9CTxbdvkjUForn-9QaVurdwQ=s151)

**SKILLS:**

- ✓ Design of hydraulic system for tractor.
- ✓ Design of ergonomical seat for agricultural tractor.

**PRACTICES:**

- Selection of tractor tires – Problem solving.
- Problem on design of governor.
- Engine testing as per BIS code.
- Drawbar performance in the lab.
- PTO test and measure the tractor power in the lab/field
- Determining the turning space and turning radius and brake test,
- hydraulic pump performance test
- Air cleaner Test
- Noise measurement test
- Visit to tractor testing centre/ industry.

**COURSE OUTCOMES:**

Upon successful completion of this course, students will have the ability to:

CO No.	Course Outcomes	Blooms Level	Module No.	Mapping with POs
1	Apply their knowledge and acquired principles on selection of different tractor sizes for different fields operation for better productivity and economy.	Apply	2	1, 3, 5, 6, 7
2	Analyze the problems faced in emission and its hazard and be able investigate in its reduction for better environment.	Analyze	2	2, 3, 4, 6, 7, 8
3	Evaluate the problems in steering using hydraulic system and solve the same for better performance.	Evaluate	2	1, 2, 4, 6, 7, 8, 9, 10
4	Create and develop different hitching system for different sizes of tractor.	Create	1	1, 3, 5, 6, 7, 8, 9, 10, 12

**TEXT BOOKS:**

1. Liljedahl J B & Others. Tractors and Their Power Units, 2005.
2. Raymond N, EA Yong and S Nicolas. Vehicle Traction Mechanics, 2007.
3. Mehta ML, SR Verma, SK Mishra, VK Sharma. Testing & Evaluation of Agricultural Machinery, 2012.
4. Maleev VL. Internal Combustion Engines, 2002.

**REFERENCE BOOKS:**

1. Kirpal Singh. Automobile Engineering, 2016 – Vol I and Vol II.
2. Richey C.B. Agricultural Engineering Handbook, 2009.