

16AG305 TRACTOR SYSTEMS AND CONTROLS

Hours Per Week :

L	T	P	C
2	-	2	3

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
30	-	30	5	40	5	8	5	-

Course Description and Objectives:

This course deals with the different systems and controls of the tractors used in various applications and their operations. This course aims to impart the knowledge on the basic prime mover of farming activities, its types, functions and capabilities in connecting various implements.

Course Outcomes:

The student will be able to:

- understand tractor system and mechanisms of different parts.
- understand various types of brakes, steering and hydraulic systems of a tractor.
- tap power through different power outlets such as drawbar, PTO and belt pulley.

SKILLS:

- ✓ *Design of gearbox, clutch assembly and final drive for tractors.*
- ✓ *Apply ergonomics for better comfort and safety in tractor operation.*
- ✓ *Operate tractor for field and haulage operations.*



ACTIVITIES:

- *Design of gearbox, differential and transmission systems for tractors.*
- *Seedbed preparation and Haulage operation using a tractor.*
- *Design of control panel for a tractor.*
- *Driving of a tractor.*

UNIT - 1**L-06**

TRANSMISSION SYSTEM: Study of transmission systems, Clutches- Functioning, Parts and design problems on clutch system; Gear box- different types of gear box, Calculation of speed ratios, Design problems on gear box, Study on differential and final drive and planetary gears, Differential and final drive mechanism.

UNIT - 2**L-05**

BRAKES, STEERING SYSTEM AND HYDRAULIC SYSTEM: Familiarization of brake mechanism, Design problems, Steering geometry and adjustments- Ackermann and hydraulic steering and hydraulic systems.

UNIT - 3**L-06**

POWER OUTLETS OF TRACTOR AND POWER TILLER: P.T.O., Belt pulley, Drawbar, etc.; Power Tiller- Construction and working, Power transmission system.

UNIT - 4**L-06**

HUMAN FACTORS IN TRACTOR DESIGN: Operator exposure to environmental factors, Operator exposure to vibration, Operator-machine interface, Noise and Vibration control, Operator seating, Sound control in operator enclosures, Spatial, Visual, and Control requirements of the operator, Rollover protection for wheeled agricultural tractors, Thermal comfort in operator enclosures, Operational safety.

UNIT - 5**L-07**

MECHANICS OF TRACTOR CHASSIS AND STABILITY ANALYSIS: Methods of finding CG of the tractor, Methods for finding moment of inertia of the tractor, Lateral and longitudinal stability of tractor, Weight transfer, Ballasting, Front and rear attached machinery, Stability analysis of tractor with trailed, semi-mounted and mounted implements.

LABORATORY EXPERIMENTS**LIST OF EXPERIMENTS****Total hours: 30**

1. Identifying transmission systems and components.
2. Calculations of speed ratios, construction and types of gear box.
3. Study of constructional details of differential and final drive.
4. Appraisal of various controls in different makes of tractors.
5. Clutch and brake systems.
6. Steering system.
7. Hydraulic system.
8. Tractors power outlets.
9. Study of tractor chassis.
10. Tractor engine heat balance and engine performance.

TEXT BOOK:

1. J. B. Liljedahl, P. K. Turnquist, D. W. Smith and Makoto Hoki, "Tractors and Their Power Units", 4th edition, CBS Publishers, 1996.

REFERENCE BOOKS:

1. S. C. Jain, and C. R. Roy, "Farm Tractor Maintenance and Repair", 3rd edition, Tata McGraw-Hill Publishing, New Delhi, 2012.
2. C. P. Nakra, "Farm Machines and Equipment", 1st edition, Dhanpat Rai and Sons, New Delhi, 2003.
3. Anthony Esposito, "Fluid Power with Applications", 7th edition, Pearson Education, 2011.

WEB LINK:

1. <http://ecoursesonline.iasri.res.in/course/view.php?id=39>