AGPC2004 TRACTOR ENGINES, SYSTEMS & CONTROLS (3-0-0)

Objective:
To enable the students for acquiring the knowledge pertaining to systems like transmission system clutch, types of clutches, types of Gear, sliding, constant mesh type tractor power out lets like P. T.O, belt pully, drawbar, traction theory rolling, resistance, rim pull, crawler tractor.

Module I
Introduction to transmission system – Power transmission system of Tractor – Functions of a power transmission system. Clutch – Necessity of clutch in a tractor – Essential features of good clutch – Principal working of clutch – Clutch repairs and maintenance. Types of Clutch – Friction clutch, Dog clutch and Fluid coupling – Friction clutch – Single Plate clutch or single disc clutch, Multiple plate clutch or multiple disc clutch, cone clutch. Single Plate clutch or single disc clutch – constructional details and principle of working mechanism. Multiple plate clutch, splinted sleeve clutch type – constructional details and principle of working mechanism Ratchet & Pawl arrangement mechanism – constructional details and principle of working mechanism.

Module II
Gears – Necessity for providing gear box – selective sliding type & constant mesh type – Mechanical advantage in gears – Torque ratio in Gears – working of Gear box. Differential unit and Final drive – Differential – Functions of crown wheel – Differential lock – functions – Final drive – functions of Final drive.

Module III
Fluid coupling and torque connector – Brake mechanism – Requirements of good braking systems – classification of brakes – Mechanical brake and Hydraulic brake – working mechanism. Steering mechanism – Qualities of Steering mechanism, Main parts of steering mechanism Types of steering boxes – working of hydraulic steering. Hydraulic control system – working principals – Basic components of Hydraulic system – Types of hydraulic system – Position control –Draft control – Mixed control – Precautions for hydraulic system.

Module IV
Tractor power out lets – P.T.O. Construction details, Tractor power out let – Belt pulley constructional details, Tractor power out let – Draw bar – construction details. Traction-Traction efficiency – Method for improving traction – Coefficient of traction – Rolling resistance – Wheel Slip or Track slip – Rimpull – crawler tractor.

Module V
Tractor testing – Preparation of tests – Types of tests – Test at the main power take off – Test at varying speeds at full load – Test at varying load-Belt or pulley shaft test – Drawbar test-Tractor engine performance. Determination of centre of Gravity – Suspension method – Balancing method – Weighing method. Tractor chassis machines – Functions of chassis frame – Tractor chassis – Mechanics of Tractor chassis.

Course Outcomes :

CO1: Demonstrate an understanding of tractor power transmission systems, including clutches, gears, and differential mechanisms.

CO2: Apply principles of fluid coupling, torque converters, and braking systems to enhance tractor functionality.

CO3: Analyze the working and maintenance of hydraulic control systems and steering mechanisms in tractors.

CO4: Evaluate tractor power outlets such as PTO, drawbars, and traction systems for efficiency and performance improvements.

CO5: Conduct tests and performance evaluations of tractors, including power take-off, drawbar tests, and center-of-gravity determinations.

TEXT BOOKS:

1. Farm Tractor Maintenance and Repair. Jain. S.C. and Roy C.R. 1984. TMH Publishing Co. Ltd., New Delhi.
2. Tractors and their power units. Liledahi J.B. Carleton W.M. Turnquist P. K. and Smith D.W. 1984. AVI Publishing Co.Inc., Westport, Connecticut.

REFERENCES:

1. Elements of Agricultural Engineering. Jasgishwar Sahay. 1992. Agro Book Agency, Patna.
2. Farm Gas Engines and Tractors. Fred J.R. 1963. Allied Publisher Pvt. Ltd., Bombay.
3. Farm Machines and their Equipment. Nakra C.P., 1986. Dhanpet Rai and Sons. 1982 Nai Sarak, New Delhi.