Course Code : AEN 301
Course Title : Farm Power and Machinery
Credit Hours : 2 (1+1) Full Marks: 50 Theory: 25 Practical: 25

OBJECTIVES

Upon the completion of this course, the students will be familiar with farm machines and equipments used in farm operations, their working principles and maintenance and upkeep.

I. SYLLABUS

Sources of farm power: Scope, availability, and limitations of farm powers; Objectives, Scope and limitations of farm mechanization in Nepal. Assessment of Farm Power Sources in Nepal; Internal combustion engines: Engine types, principles of operation of two-stroke and four-stroke cycle compression ignition (diesel) and spark ignition (petrol) engines. Systems in two-wheel and four-wheel tractor engines- fuel supply, air cleaning, cooling, lubrication; farm tractors and their management:types and suitability of farm tractors in Nepalese agriculture; Tillage and tillage implements:Conservation versus Conventional Tillage. Operation and management of primary tillage implements- Indigenous tillage implement used in Nepal, mould board plows and their components, Disc Ploughs and their components. Operation and management of secondary tillage implements- harrows, cultivators, rotary tillers and rotavator. Special tillage implements and Tool: chisel plow, sub-soiler, ridger and bund former, puddler and leveler; Sowing and planting machines: methods of seeding and planting and metering mechanisms for seed and fertilizer in drills and planters, zero-till, reduced/minimum till drills and planters, potato and sugarcane planters, rice drum seeder and paddy trans-planters; Plant protection equipments: Working Principle and components of sprayers and their types , Safety in handling plant protection machines; Harvesting Machines: Indigenous harvesting tools used in Nepal, Mowers- types, working principle and constructional details, Reapers and Reaper binder- Types, working principle and constructional details; Potato Digger- working principle and constructional details; Selection and Economics of Farm Machines and Equipment: Field capacity and efficiency; Cost of operation of Farm Machines- fixed and variable costs, Feasibility of custom hiring of farm machines and equipment in Nepal.

II. COURSE OUTLINE

A. Lecture

S. N.	Topic	No. of Lectures
1.	Sources of farm power: Scope, availability, and limitations of farm powers – human, animal (animal power harnessing system), mechanical, electrical, wind, micro-hydro, biogas, and solar. Objectives, Scope and limitations of farm mechanization in Nepal. Assessment of Farm Power Sources in Nepal.	1
2.	Internal combustion engines: Engine types, principles of operation of two-stroke and four-stroke cycle compression ignition (diesel) and spark ignition (petrol) engines. Components of internal combustion engines and their functions. Systems in two-wheel and four-wheel tractor engines- fuel supply, air cleaning, cooling, lubrication.	2
3.	Farm tractors and their management: Farm tractor types, control systems on tractors; power transmission, clutch and brake, steering, power-take-off, differential, hydraulic, and hitch systems, suitability and tractor selection for Nepalese agriculture	2
4.	Tillage and tillage implements: Definition and Objectives of tillage, Conservation versus Conventional Tillage. Indigenous tillage implement used in Nepal.	1
5.	Operation and management of primary tillage implements-, mould board plows and their components, Disc Ploughs and their components. Operation and management of secondary tillage implements- harrows, cultivators, rotary tillers and rotavator. Operation of animal and tractor drawn disk harrows, spike tooth harrows and Spike tooth harrow. Special tillage implements and Tool: chisel plow, sub-soiler, ridger and bund former, puddler and leveler	2
6.	Sowing and planting machines: methods of seeding and planting and its type, metering mechanisms for seed and fertilizer in drills and planters, types of furrow openers and covers on seed/seed-cum-fertilizer drills and planters, zero-till, reduced/minimum till drills and planters, potato and sugarcane planters, rice drum seeder and paddy trans-planters	2
7.	Plant protection equipments: types of sprayers and dusters, Working Principle and components of sprayers, nozzles used on sprayers and their selection, Safety in handling plant protection machines	1
8.	Harvesting Machines: Indigenous harvesting tools used in Nepal, Mowers- types, working principle and constructional details, Reapers and Reaper binder- Types, working principle and constructional details; Potato Digger- working principle and constructional details	1
9.	Threshing machines: Threshing methods and their mechanization, Types of threshers, their working principles and constructional details, Factors affecting thresher performance. Mize Sheller and its construction detail	1
10.	Combine harvester: Components and working Principle.	1
11.	Selection and Economics of Farm Machines and Equipment: Field capacity and efficiency, Cost of operation of Farm Machines- fixed and variable costs, Feasibility of custom hiring of farm machines and equipments in Nepal	1
	Total	**15**

B. Practical

S. N.	Topic	No. of Practicals
1.	Identification of workshop tools	1
2.	Identification of internal combustion engine components	1
3.	Study of Indigenous tillage tool and mould board plow	1
4.	Study of disk plow and disk harrow	1
5.	Study of rotary tillers and rotavator	1
6.	Study of seed drills and planters- zero-till drill, seed calibration	2
7.	Study of rice drum seeder and transplanter	1
8.	Study of knap-sack sprayers and their operation	1
9.	Study of power operated reaper	1
10.	Study of maize shellers and paddy or multi-crop threshers	1
11.	Study of external tractor components and controls	2
12.	Study of power tiller controls	1
13.	Tractor and power tiller operation	1
	Total	**15**

REFERENCES

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