

FM 227 FARM MACHINERY AND EQUIPMENT – I

Cr. Hrs. 3 (2 + 1)

	L	T	P
Credit	2	0	1
Hours	2	0	2

Unit-I

Objectives of farm mechanization: Introduction to various farm operation, implement types. Classification of farm machines. Materials of construction. Tillage and its objectives. Field capacities, field efficiency and simple numerical problems.

Unit-II

Primary and secondary tillage equipment; Ploughs-Desi, Mouldboard, Subsoiler, Rotary tiller and Puddlers. Forces acting on M.B. Plough and disc harrow. Draft measurement of tillage equipment and simple numerical problems.

Unit-III

Crop planting methods : Sowing and planting equipment - their construction, metering mechanism, furrow openers, covering devices and metering mechanism for fertilizer applications, calibration and adjustments. Paddy transplanter and its construction. Simple numerical problems on seed drills and planters. Introduction to plot seed drills and precision planters.

Unit-IV

Methods and equipments for interculture and weed control. *Introduction to plant protection equipment:* Sprayers, dusters and their calibration, Constructional features of different components and adjustments of knapsack and foot sprayers and rotary duster. Simple numerical problems on calibration of sprayers. Introduction to earth moving equipment, construction & working principles of Bulldozer and numerical problems on its output.

Practicals

1. Introduction to various farm machines and visit to implement's shed.
2. Construction details, adjustments and working of M.B. plow.
3. Construction details, adjustments and working of disc plow.
4. Construction details, adjustments and working of disc harrow.
5. Construction details, adjustments and working of secondary tillage tools.
6. Field capacity and field efficiency measurement of tillage and planting equipment.
7. Draft & fuel consumption measurement of different implements.
8. Working of seed-cum-fertilizer drill and its calibration.
9. Working of planters.
10. Weeding equipments and their use.
11. Study of knapsack and foot sprayers.
12. Study of rotary duster.

13. Construction and working of rotavator.
14. Study of bulldozer.

Text Books\References

1. Bainer, R. Barger, E.L. and R.A. Kepner. (1997). Principles of Farm Machinery. John Wiley & Sons, Inc, New York.
2. A.C. Shrivastava et al. Principle of Farm Machinery ASAE publications.
3. H.P. Smith. (1977). Farm Machinery and Equipment, Tata Mc-Graw Hill Publishing Co. Ltd., New Delhi.
4. H Singh and O.S. Bindra. (1980). Pesticides and Application Equipment, Oxford & IBM publishing Co.
5. O.P. Singhal. Elements of Agricultural Engineering, Part I and II. Saroj Prakashan, Allahbad.
6. FAO, Bulletin. (1977). Elements of Agricultural Machinery, volume I.
1. R.L. Peurifoy. Construction, Planning, Equipment and Methods.
2. Singh, S. Principles of Farm Machinery. DIPA, ICAR, KAB-I, New Delhi

FM 228 FIELD OPERATION AND MAINTENANCE OF TRACTORS

Cr. Hrs. 1 (0 + 1)

	L	T	P
Credit	0	0	1
Hours	0	0	2

Practical:

1. Identification and location of various systems of a tractor viz. fuel, lubrication, cooling, electrical, transmission, hydraulic and final drive system.
2. Familiarisation with tractor controls and learning procedure of tractor starting and stopping.
3. Study of driving safety rules: Road signs, traffic rules, road safety, driving and parking of tractor.
4. Familiarisation with different makes and models of tractors in India.
5. Forward and reverse tractor driving practice.
6. Tractor driving practice with two wheeled tractor trailer forward and reverse.
7. Familiarisation with tools and equipment used for maintaining and servicing of tractors and farm machines; Doing the 10-hours service jobs and Maintenance after 50- hours of operation; Maintenance after 100 hours of operation; Maintenance after 250 hours of operation; Maintenance after 500 hours and 1000 hours of operation.
8. Dismantling and assembling of major engine parts.
9. Visit to tractor/ engine repair workshop.

Text Books / References

1. Jacobs. Co. and William R.H., Agricultural power and machinery, Mc-Garw Hill Book Company
2. Rai and Jain, Tractor maintenance & repair.
3. Service manuals of various tractors.

FE 324 TRACTOR SYSTEMS AND CONTROLS

Cr. Hrs. 3 (2 + 1)

	L	T	P
Credit	2	0	1
Hours	2	0	2

Unit-I

Study of transmission system: Clutch: single and multiple clutches and their functions, gear box: sliding and constant mesh, differential and final drive mechanism. Simple numerical problems on clutch and gear speed ratios.

Unit-II

Familiarization of brake mechanism: Mechanical and hydraulic. Steering: Ackerman and hydraulic. Hydraulic system of tractor: Automatic position and draft control.

Unit-III

Tractor power outlets: P.T.O., belt pulley, drawbar. Introduction to traction mechanics. Tractor chassis mechanics: C.G. determination and weight transfer. Simple numerical problems on tractor chassis mechanics.

Unit-IV

Tractor stability: Grade and non-parallel pull, turning at high speed. Simple numerical problems on tractor stability. Introduction to ergonomic considerations: Anthropometry and physiological cost measurements and tractor safety. Introduction to advances in tractor systems and controls.

Practicals

1. Introduction to transmission systems and components.
2. Study of clutch system.
3. Study of different types of gear box and calculation of speed ratios.
4. Study on differential and final drive of a tractor.
5. Study of brake system of a tractor.
6. Study of hydraulic system in a tractor.
7. Study of traction performance of a tractor wheel.
8. Anthropometric measurements of a farm worker.
9. Measurement of physiological cost of tractor operator during farm operation.
10. Study of advances in tractor systems and controls.

Text Books\References

1. B.J. Liljedahl, P.K. Turnquist, W.D. Smith and Hoki Vaketo. (1989). Tractor and their Power units. Jhon Wiley & Sons., New York.
2. F.R. Jones. Farm Gas Engines & Tractors – Mc. Grow Hill Book Company, New York.
3. Mosses & Frost. Farm Power, John Wiley & Sons, New York.
4. Rai & Jain. Farm Tractor Maintenance and repair, Tata McGraw Hill Publishing Co.Ltd., New-Delhi.

**FE 325 FIELD OPERATION AND MAINTENANCE OF
FARM MACHINERY**

Cr. Hrs. 2 (0 + 2)

	L	T	P
Credit	0	0	2
Hours	0	0	4

Practical:

1. Study and practising the hitching and de hitching of implements.
2. Field operation and field adjustments of m.b. plough and disk plough.
3. Field operation of disk harrow.
4. Field operation and adjustments of weeding equipment (Wheel hoe/power weeder).
5. Adjustment and maintenance of seeding and planting machines.
6. Field operation of seed drill/planter.
7. Adjustment and maintenance of a foot sprayer/knapsack sprayer.
8. Field operation, adjustment and maintenance of a vertical conveyor reaper.
9. Field operation, adjustments and maintenance of power thresher.
10. Adjustment and maintenance of a combine harvester.
11. Visit to small scale farm machinery manufacturing unit.

Text Books / References

1. Jacobs. Co. and William R.H., Agricultural power and machinery, Mc-Garw Hill Book Company
2. Service manuals of various agricultural machinery.