

16AE303 SPECIAL PURPOSE VEHICLES

Hours Per Week :

L	T	P	C
2	1	2	4

Total Hours :

L	T	P	WA/RA	SSH/HSB	CS	SA	S	BS
45	-	30	2	40	2	3	2	-

Course Description and Objectives:

This course offers understanding on fundamental concepts of tractor design, mechanisms in tractors and trailers, farm equipment design and working principles of various off-road vehicle. The objective of this course is to impart basic knowledge on different types of special vehicles, tractor mechanisms and farm equipment along with practical experience on different equipment.

Course Outcomes:

The student will be able to:

- understand the concepts in general design of tractors, safety, crumple zone and crash testing.
- understand cooling, lubrication and fuel systems of various off-road vehicles.
- familiarize with the various types of farm machine transmission systems.
- understand importance of driver's visibility and cabin design.
- gain knowledge on different types of farm equipment.

SKILLS:

Perform efficient and economic operation of earth moving vehicles

Troubleshooting of tractors/farm machines

Adjust pedal play in clutch, brake, hand brake lever and steering wheel play.

UNIT - 1**L-10**

GENERAL DESIGN OF TRACTORS: Classification of tractors, Main components of tractor, Safety rules, Fundamentals of Engine Operation, Tractor controls and the starting of the tractor engines, Basic notions and definition, Engine cycles, Operation of multicylinder engines, General engine design, Basic engine performance characteristics.

UNIT - 2**L-9**

ENGINE MECHANISM OF TRACTOR: Cylinder and pistons, Connecting rods and crankshafts, Engine balancing, Constructio and operation of the valve mechanism, Valve mechanism components, Valve mechanism troubles.

UNIT - 3**L-10**

EARTH MOVING MACHINES : Bulldozers, Cable and hydraulic dozers, Crawler track, Running and steering gears, Scrapers, Drag and self-Powered types, Dump trucks and dumpers, Loaders, single bucket, Multi bucket and rotary types, Power and Capacity of earth moving machines.

UNIT - 4**L-9**

DIFFERENT TYPES OF EQUIPMENT : Transport equipment, Powered equipment, Tractors and Trollies, Trailers, Platform lift trucks, Fork lift trucks, containers and Supports, Hauling equipment: Types of dump trucks, High way vehicles, off high way vehicles, Hoisting equipment: Jacks, truck mounted crane, Crawler crane, Outriggers, Military purpose vehicle.

UNIT - 5**L-7**

FARM EQUIPMENT: Working attachments of tractors, Farm equipment, Classification, Auxiliary equipment, Trailers and body tipping mechanism.

ACTIVITIES:

- *Practice driving and operation of different off-road vehicles*
- *Troubleshoot tractors and farm machinery*
- *Design and analyze different safety devices for tractors and farm equipment*

LABORATORY EXPERIMENTS**LIST OF EXPERIMENTS**

Total hours:30

1. Tractor driving practice.
2. Case study on Tractors.
3. Driving practice on Dozers.
4. Earth moving equipment.
5. Demonstration on:
 - i) adjustment of pedal play in clutch, brake, hand brake lever and steering wheel play
 - ii) air bleeding from hydraulic brakes, air bleeding of diesel fuel system
 - iii) wheel bearings tightening and adjustment
 - iv) adjustment of head lights beam
 - v) disassembly and assemble of tyre and tube
6. Study on Military vehicles.
7. Practice on working attachments of Tractors.

TEXT BOOK:

1. E.L.Barger, J.B.Liljedahl,W.M.Carleton, E.G.Mckibben, "Tractors and their Power Units", 3rd edition, Chapman & Hall, 2008.