

1152AU109

OFF HIGHWAY VEHICLES

L T P C

3 0 0 3

1. Preamble

This course imparts knowledge in the vehicles used for agriculture, army and construction purposes and earth movers.

2. Prerequisite

1151AU214 Automotive Chassis

1151AU108 Automotive Transmission

3. Links to other Courses

Automotive chassis, vehicle body engineering

4. Course Educational Objectives

Students undergoing this course are expected to:

- Gain knowledge about the vehicles used in agriculture, mining and construction.
- Gain knowledge about the working of different systems in special vehicles.

5. Course Outcomes

Upon the successful completion of the course, learners will be able to

CO Nos.	Course Outcomes	Level of learning domain (Based on revised Bloom's)
CO1	Understand the different types of cranes and compactors used in market and would be in position to select and discuss the right type for the given application	K2
CO2	Explain the different types of excavator and graders, further, would be able to enumerate and explain the different sub systems	K2
CO3	Describe the construction and working of haulage vehicle and lift trucks in the perspective of their applications	K3
CO4	Describe the specifications, functions, merits and demerits of different types and subsystems of rooters, scarifiers and scrapers	K2
CO5	Explain the different types of tractors and other special vehicles in the perspective of different types, application, requirement and availability in the market	K2

(K2 – Understand; K3 – Apply)

6. Correlation of COs with Programme Outcomes

COs	PO1	PO2	PO3	PO4	PO5	PO6	PO7	PO8	PO9	PO10	PO11	PO12	PSO1	PSO2
CO1	M	H	L	H		L	L						M	L
CO2	M	H	L	H		L	L						M	L
CO3	M	H	L	H		L	L						L	L
CO4	M	H	L	H		L	L						M	M
CO5	M	H	L	H		L	L						L	M

H- High; M-Medium; L-Low

7. Course Content

UNIT I CRANES & COMPACTION VEHICLES

L-9

CRANES - General Description, Specifications and Functions, Excavator Mounted Cranes, Mobile Cranes With Strut and Cantilever Type Jibs, Tractor Towed and Tractor Mounted Cranes.

COMPACTION VEHICLES - General Description, Specification and Functions, Smooth Wheeled Rollers, Pneumatic Tired Rollers, Agricultural Rollers, Sheep's Foot Rollers - Vibrating Compactors.

UNIT II EXCAVATORS & GRADERS

L-9

EXCAVATORS: General Description, Specification and Functions, Classification Based on Attachments, Face Shovel, Drag Shovel, Hoe, Drag-Line and Grab or Clam Shell, Advantages and Limitations.

GRADERS: Description, Specification of Tractor Towed Graders and Motor Graders, Classification and Functions of Graders, Functional Details of Spreading, Mixing, Ditching, Bank Sloping, Snow Removal, Stripping, Scarifying and Finishing, Elementary Details of Transmission System (Coupling, Clutches, Gear Box, Driving Axles, Propeller Shafts), Running Gear and Operating Equipment Air Braking System - Hydraulic System and Its Components, Steering System of Lights, Medium and Heavy Graders, Merits and Limitations of Graders.

UNIT III HAULAGE VEHICLES & LIFT TRUCKS

L-9

HAULAGE VEHICLES - General Description, Specification and Functions, Self-Propelled and Tractor Towed Haulage Vehicles and Pneumatic – Tires, Dumpers – Front Tipping - Trucks – Rear Tipping, Tractor Towed Semi-Trailers and Trailers (Rear and Side Tipping, Bottom Dumping).

LIFT TRUCKS - General Description, Specification and Functions, Fork Lift Trucks, Alternative Front End Equipment (Attachments) – Jib Arm, Shovel Bucket, Squeeze Clamp, Boom, Fork Extensions, Barrel Forks. Scissors Lift Trucks - Applications in Industry, Advantages and Disadvantages.

UNIT IV ROOTERS AND SCARIFIERS & SCRAPERS

L-9

ROOTERS AND SCARIFIERS - General Description, Specification and Functions, Tractor Towed Rooters and Scarifiers {Heavy Duty (Roller)/ Light Duty (Grader)} Back Rippers for Bull and Angle Dozers.

SCRAPERS - General Description, Specification and Functions, Tractor Towed and Motorized Scrapers, Scraper Work in Cutting, Cambering, Side Hill Cutting, Spreading on Embankments, Compaction of Fill Merits and Demerits.

UNIT V TRACTORS & OTHER SPECIAL PURPOSE VEHICLES

L-9

TRACTORS - General Description, Specification and Functions, Light, Medium and Heavy Wheeled Tractors, Crawler Tracks Mounted / Wheeled-Bull Dozers, Tilt Dozers and Angle Dozers, Front End Loaders, Factors Affecting Efficiency of Output of Tractors, Simple Problems, Merits and Demerits.

OTHER SPECIAL PURPOSE VEHICLES - Mining and Surveillance General Description, Specification and Functions, Ambulance, Oil Tankers, Surveillance Vehicle, Television Recording Mobile, Reefer Vehicle, Double Decker Bus, Vestibule Bus, Fire Fighting Vehicle

Total: 45 Periods

8. Text Books :

1. Ian Andrew Norman, "Heavy Duty Vehicle systems", third edition, Delmar-Thomson Learning ltd.
2. Robert L Peurifoy, "Construction, planning, equipment and methods" Tata McGraw Hill Publishing company Ltd.
3. Nakra C.P., "Farm machines and equipments" Dhanparai Publishing company Pvt. Ltd

9. References :

1. Her Majesty's Stationery, "Military Engineering – Volume 26".
2. Heinz Heisler, "Vehicle and Engine Technology" second edition, SAE-1999, USA.
3. SAE Handbook Vol. III., Society of Automotive Engineers, 1997