

19AME75a – SPECIAL TYPE OF VEHICLES

(Open Elective-III)

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Course Objectives: The objectives of the course are to make the students learn about

- Introduce the various types of special vehicles.
- Familiarize with the function of graders.
- Identify the applications of haulage vehicles and lift truck
- Understand the functions of scarifiers and scrapers
- Discuss the specifications of special purpose vehicles

UNIT – I: TRACTORS & CRANES AND EXCAVATORS

8 Hrs

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.

CRANES AND EXCAVATORS: General description, specifications and functions, excavator mounted cranes, mobile cranes with strut and cantilever type jibs, tractor towed and tractor mounted cranes. General description, specification and functions, classification based on attachments, face shovel, drag shovel, hoe, drag-line and grab or clam shell, advantages and limitations.

Learning Outcomes:

At the end of this unit, the student will be able to

- Classify various types of tractors L1
- Calculate the efficiency of output of tractors L4
- Discuss the functions of cranes and excavators L2
- Recall the advantages and limitations of cranes and excavators L2

UNIT – II: GRADERS

6Hrs

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.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the terms spreading, mixing, ditching, bank sloping, scarifying. L2
- Discuss elementary details of transmission system L2
- Demonstrate the hydraulic system and its components. L3
- List the merits and limitations of graders. L2

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UNIT – III: HAULAGE VEHICLES AND LIFT TRUCKS

6Hrs

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). 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.

Learning Outcomes:

At the end of this unit, the student will be able to

- Understand the importance of haulage vehicles and trucks in industries. L2
- Select haulage vehicles for a given application L6
- Illustrate the function of fork lift trucks. L3

UNIT – IV: Rooters, Scarifiers And Scrapers

6 Hrs

General description, specification and functions, tractor towed rooters and scarifiers - Heavy duty, light duty. 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.

Learning Outcomes:

At the end of this unit, the student will be able to

- Describe the specifications of rooters L2
- Categorize Heavy duty and light duty scarifiers L4
- Recall the merits and demerits of scrapers. L1

UNIT – V: Compaction Vehicles And Other Special Purpose Vehicles

6Hrs

General description, specification and functions, smooth wheeled rollers, pneumatic tired rollers, agricultural Rollers, sheep’s foot rollers, vibrating compactors. General description, specification and functions, Ambulance, oil tankers, surveillance vehicle, television recording mobile UNIT, reefer vehicle, double decker bus, vestibule bus, fire fighting vehicle.

Learning Outcomes:

At the end of this unit, the student will be able to

- List various types of special purpose vehicles. L1
- Choose the rollers for a given application. L1
- Discuss the function of compactors. L2
- Explain the importance of special purpose vehicles in the society. L2

Text Books:

1. Peurifoy R L “Construction Planning, Equipment and Methods”, Tata McGraw-Hill, NewDelhi, 2002.
2. Ian Graham, “Off-Road vehicles”, Heinemann Library, 2008.

Reference Books:

1. Wong J “Terramechanics and Off-Road Vehicle Engineering”, Butterworth-Heinemann, 2009.
2. Roninson E G, “Motor Graders”, MIR Publications, Moscow, 1985.
3. Rodhiev and Rodhiev, “Tractors and Automobiles”, MIR Publishers, Moscow, 1984.
4. Greenwich and Soreking, “Tractors“, MIR Publishers, Moscow, 1967.

Course Outcomes:

At the end of this Course the student will be able to

- Classify excavators based on attachments. L2
- Understand the importance of graders. L2
- Identify the various types of fork lift attachments. L2
- Recall the advantages and disadvantages of special purpose vehicles. L1