

**EXCITING WORLD OF
AUTOMOBILES**



STUDENT WORKBOOK

Curriculum :AUTO-SRV L1-NQ²⁰¹²

Unit :AUTO-SRV L1U2

Various Types of Automobiles

Vocational Learning Material for Schools

PSS Central Institute of Vocational Education

Bhopal

PREFACE

Improving the parity of esteem between the general academic education and vocational education, is the policy priority of the Government of India. The National Vocational Education Qualification Framework (NVEQF) developed by the Ministry of Human Resource Development (MHRD), Government of India, is a descriptive framework that provides a common reference for linking various qualifications. It will be used for setting common principles and guidelines for a nationally recognized qualification system covering Schools, Vocational Education and Training Institutions, Technical Education Institutions, Colleges and Universities. The NVEQF will act as a translation device to make qualifications more understandable to employers, students and institutions. It will promote transparency of qualifications and facilitate learner's mobility between different qualifications, thus encouraging lifelong learning. PSSCIVE has taken lead in development of learning material for the Automobile Sector for all level in collaboration with the Automobile Skill Development Corporation (ASDC).

The present material contains activity related to Level L-1 for the Automobile service sector. This will fulfill the needs of the students willing to learn activities relating to the Automobile Service Sector. Any student/ entrepreneur willing to start an Automobile Service Sector can acquire the desired competencies with the help of this book.

The book has been written by experts but reviewed by all the members of the group. I am grateful to the authors for the development of this book and to the members of the Working Group for their candid suggestions, during the development and review. Their names are given elsewhere.

I appreciate efforts put in the by Dr. Saurabh Prakash, as the Project Coordinator of the Working Group in planning and organizing Meetings which led to the final form of this title.

I shall be grateful to receive suggestions and observations from readers, which would help in bringing out a revised and improved version of this book.

Bhopal
June, 2012

Prof. R.B. Shivagunde
Joint Director
Pandit Sunderlal Sharma
Central Institute of Vocational Education

© Ministry of Human Resource Development 2012

Copyright protects this publication. Except for purposes permitted by the Copyright Act, reproduction, adaptation, electronic storage and communication to the public are prohibited without prior written permission.

This student workbook was developed, with active involvement of the Automobile Skill Development Council (ASDC) keeping in view the National Occupation Standard (NOS) for Service Technician L4 developed by ASDC.

This project for development of the student workbook was coordinated by the PSS Central Institute of Vocational Education, a constituent unit of National Council of Educational Research and Training, which is under the Ministry of Human Resource Development, Government of India.

Student Details

Student Name: _____

Student Roll Number: _____

Batch Start Date: _____

Contents

About this workbook.....	5
Unit information.....	6
Elements and performance criteria.....	7
Relevant knowledge and skills.....	8
Assessment plan.....	9
Introduction	11
Session 1: Two wheelers and Three wheelers	12
Relevant Knowledge:.....	12
Exercise.....	15
Assessment Activities	16
Checklist for Assessment Activities.....	17
Session 2: Passenger vehicles and Commercial Vehicles	18
Relevant Knowledge:	18
Exercise.....	21
Assessment Activities.....	22
Checklist for Assessment Activities.....	22
Session 3: Agricultural Vehicles	23
Relevant Knowledge	23
Exercise.....	25
Assessment Activities.....	26
Checklist for Assessment Activities.....	27
Session 4: Construction Equipment Vehicles	28
Relevant Knowledge:	28
Exercise.....	31
Assessment Activities.....	32
Session 5: Special Vehicles	33
Relevant Knowledge:	33
Exercise.....	36
Assessment Activities	37
Checklist for Assessment Activities.....	37
Suggested Readings	38
Contributors to the Workbook Development.....	39

About this Workbook

This workbook is to assist students with completing the Auto Sector **L1U2-NQ2012** unit of competency: **Various types of Automobiles**. Students should study the workbook in class or in their own time.

This workbook contains sessions for imparting knowledge & skills on various aspects of the unit of competency. The workbook also includes information, exercises, and assessment activities to complete. The assessment plan has been included in the workbook to assist you in scheduling your time for completing the assignments. Each assessment activity is followed by a checklist for meeting the assessment criteria. The criteria will help you to ensure that you have fulfilled all of the assessment requirements to receive a 'competency' grading/Certification by ASDC.

Unit Information**Unit name: Various Types of Automobiles****Unit code: Auto L1U2-NQ2012****Unit descriptor:**

This unit provides the broader knowledge & skills covering various types of automobiles viz i.e., two wheelers, three wheelers, four wheelers, passenger vehicles, commercial vehicles, agricultural vehicles, construction equipment vehicles and special vehicles

Resources required:

- Notebooks, Pen, Pencil, Eraser, Computer, Open Source Software for making digital presentation, LCD projector, Drawing of various vehicles, Photographs, Animation and videos of various types of vehicles/ automobiles used in daily life or in commercial/industrial applications. Posters for building awareness about various types of automobiles. Toy model of various types of vehicles.

Nominal hours: 35 hours

Elements and Performance Criteria

- Elements define the critical learning outcomes of a unit of competency.
- Performance criteria specify the level of performance required to demonstrate the achievement of the Competency Element.

Element	Performance Criteria
<ul style="list-style-type: none"> • Use and Application of Two wheelers, Three wheeler model, and specifications. 	<ul style="list-style-type: none"> • Able to identify two wheelers and three wheeler . • Able to make sketches of two wheeler/ three wheelers
<ul style="list-style-type: none"> • Use and Application of Passenger Vehicles 	<ul style="list-style-type: none"> • Able to identify passenger vehicles • Able to make sketches of passenger vehicles
<ul style="list-style-type: none"> • Use and Application of Commercial Vehicles 	<ul style="list-style-type: none"> • Able to identify various Commercial Vehicles like tempo, bus and truck. • Able to make sketch of various Commercial Vehicles.
<ul style="list-style-type: none"> • Use and Application in Agriculture vehicles 	<ul style="list-style-type: none"> • Able to identify Agricultural Vehicles like tractors, harvester combine. • Able to make sketches of tractor, harvester cobine.
<ul style="list-style-type: none"> • Use and Application of Special Applications Vehicles 	<ul style="list-style-type: none"> • Able to identify Dumper <ul style="list-style-type: none"> - Dozer - Tiller - Excavator - Road Roller

	<ul style="list-style-type: none">- Crane- Fork Lift- Oil / water tankers- Trailers- Railway Train- Fire Tender• Able to make sketch of<ul style="list-style-type: none">- Dozer- Tiller- Excavator- Road Roller- Crane- Fork Lift- Oil / water tankers- Trailers- Railway Train- Fire Tender
--	--

Relevant Knowledge and Skills

1. Relevant Knowledge

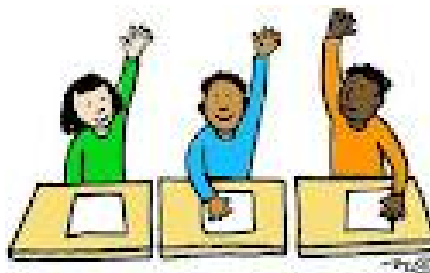
Two Wheelers
 Three Wheelers
 Passenger Vehicles
 Commercial Vehicles
 Agricultural Vehicles
 Construction Equipment Vehicles
 Special Vehicles

2. Skills

Able to identify and describe application of
 Two Wheeler
 Three Wheeler
 Passenger Vehicles
 Commercial Vehicles
 Agricultural Machinery
 Construction Equipment Vehicles
 Special Vehicles.

Assessment Plan

Session No.	Assessment method	Due Date	Completion Date
1.	Fill in the Blanks		
2.	Fill in the Blanks		
3.	Fill in the Blanks		



Introduction

The Automotive industry in India is one of the largest in the world and one of the fastest growing globally. India's Passenger Car and Commercial Vehicle manufacturing industry is the seventh largest in the world, with an annual production of more than million units in 2011.

The Automobile segment comprises of the following four broad categories of vehicles:

Two-Wheelers and Three-Wheelers

Passenger Vehicles

Commercial Vehicles

Special Application Vehicles

Two-Wheelers, being the most popular means of personal transport, account for about 75% of the total automobile production in India, while Passenger Vehicles account for nearly 16% of the production. However, owing to their lower price. Two wheelers account for only around 32% of the sales in terms of value, while Passenger Vehicles account for around 62% of sales.

As of 2010, India is home to 40 million Passenger Vehicles. More than 3.7 million Automotive Vehicles were produced in India in 2010 (an increase of 33.9%), making the country the second fastest growing automobile market in the world. According to the Society of Indian Automobile Manufacturers, annual vehicle sales are projected to increase to 5 million by 2015 and to more than 9 million by 2020. By 2050, the country is expected to be at the top the world in car volumes with more than 600 million vehicles on the nation's roads.

In this Unit, you will develop an understanding of the different types of vehicles used in our country viz., Two Wheeler, Three Wheeler, Passenger Vehicles, Commercial Vehicles, Agricultural Vehicles, Construction Equipment Vehicles and Special Application Vehicles.

Session 1: Two Wheelers and Three Wheelers

Relevant Knowledge

Two Wheelers

As the name suggests, a two wheeler refers to vehicles, that run on two wheels. Two wheelers are used all over the world. In developed, rich countries, two wheelers are used more for recreational purpose. Whereas in our country it is an important means of transportation of passengers, both in urban as well as rural areas. India has the largest population of two wheelers. More than 5.4 million two wheelers are produced in our country every year. Motorcycles, Scooters and Mopeds are the categories of two wheelers in our country. Motorcycle segment is about 78% in two wheeler segment. Balance 22%, comprise of the scooters and mopeds.

India is the second largest producer of two-wheelers in the world. In the last few years, the Indian two-wheeler industry has seen spectacular growth. The country stands next to China and Japan in terms of production and sales respectively.

Majority of Indians, especially the youngsters, prefer motorbikes rather than cars. Capturing a large share in the two-wheeler industry, bikes and scooters cover a major segment. Bikes are considered to be the favourite among the youth as they help in easy commutation and also look stylish. Large variety of two wheelers are available in the market, known for their latest technology and enhanced mileage. Indian bikes, scooters and mopeds represent style and class for both men and women in India.

Benefits of Two Wheelers

Two-wheelers are the most popular and highly sought out medium of transport in India. The trend of owning Two-Wheelers is due to their-

- Economical price
- Safety
- Fuel-efficiency

- Comfort level

However, some Indian bike enthusiasts prefer high performance imported bikes. Some of the most popular high-speed bikes are Suzuki Hayabusa, Kawasaki Ninja, Suzuki Zeus and Honda Unicorn. These super bikes are specially designed for those who have a zeal for power and speed.

We can conclude that a motorcycle is a motor-powered two wheeler, similar in construction with bicycles.

Identification of Two Wheeler:

You must have seen various types of two wheelers in your area or on the roads. Every Two Wheeler has a sticker of its model type and name of the manufacturer. You can identify the make of the Two Wheeler by the sticker /logo fixed on body. Popular brands of Two Wheeler manufacturers are Hero, Honda, Bajaj, TVS, Suzuki. Two Wheeler manufacturers produces different models as per given specification. Some of famous models are given below:

Hero make	-	Impulse, Splendor, CDdawn, Pleasure, Passion Plus
Bajaj make	-	Pulsar , Discover, Platina
TVS make	-	Apache, Star, Scooty streak, Scooty Pep, Star City
Honda make	-	Activa, Dio, aviator
Suzuki make	-	Access, Intruder M800, Zeus

These models vary by size, weight, dimension type size, engine capacity.



Fig : Photograph of popular two

Three Wheelers

A Three-Wheeler is a vehicle with three wheels, either "human or people-powered vehicles" (HPV or PPV) or motorized vehicles in the form of a tri-motorcycle, all-terrain vehicle (ATV) or automobile.

Auto rickshaws (often called just auto) are common all over India, and provide cheap and efficient transportation. New auto rickshaws run on CNG and are environmentally friendly. Typical mileage for an Indian-made auto rickshaw is around 35 kilometers per liter of petrol (about 2.9 L per 100 km, or 82 miles per gallon [United States (wet measure), 100 miles per gallon Imperial (United Kingdom, Canada)]. Many major nationalized banks in India offer loans to self-employed individuals seeking to buy auto rickshaws. Auto rickshaw manufacturers in India include Bajaj Auto, Kumar Motors, Kerala Auto Limited, Force Motors (previously *Bajaj Tempo*),

Mahindra & Mahindra, Piaggio Ape and TVS Motors. Auto rickshaws are found in cities, villages and in the countryside.

There are two types of auto rickshaws in India. In older versions the engines were situated below driver's seat. In newer versions engines are in rear portion. They normally run on petrol, CNG and diesel. The seating capacity of a normal rickshaw is 4, including the driver. There are also six-seated rickshaws in parts of Maharashtra. In cities and towns across India it is the backbone of city transport. Normally their fare rates are controlled by govt. They have traffic meters.

Many three-wheelers which exist in the form of motorcycle-based machines are called trikes and often have the front single wheel and mechanics similar to that of a motorcycle and the rear axle similar to that of a car. Sometimes such vehicles are owner-constructed using a portion of a rear-engine, rear-drive Volkswagen Beetle in combination with a motorcycle front end.

Other trikes include ATVs that are specially constructed for off road use. Three-wheeled automobiles can have either one wheel at the back and two at the front, (for example: Morgan Motor Company) or one wheel at the front and two at the back (such as the Reliant Robin).



Fig. : Photograph of popular three wheelers



Fig. : Photograph of popular three auto wheelers

These are some of the popular three wheeler which are used for transporting of people and goods.

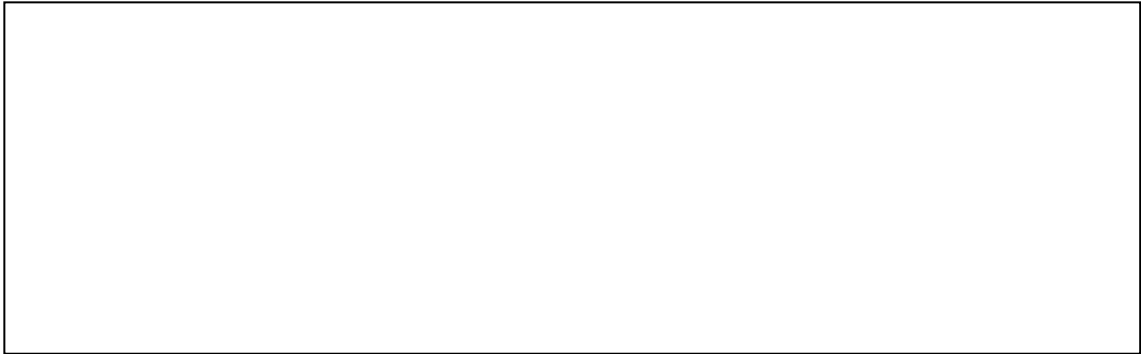
Session 1: Two wheelers and Three wheelers

Exercise: Assignment

- List the models of two wheelers and three wheelers used in your area:

S.No.	Name of model
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

2. Observe and identify two types of two wheelers in your school and draw their diagrams



Session 1: Two wheelers and Three wheelers

Answer the following questions

(Use additional sheets of paper if necessary)

A. Fill in the blanks

1. A two wheeler refers to _____ that run on two wheels. Two wheelers are used all over the _____.
2. More than 5.4 million _____ are produced in our country every year.
3. A Majority of Indians, especially the youngsters prefer _____ rather than cars.
4. Motorcycle is a motor-powered _____, similar in construction to bicycles.
5. A three-wheeler is a vehicle with _____ either "human or people-powered vehicles" (HPV or PPV) or motorized vehicles in the form of a _____ or automobile.
6. Auto rickshaws are _____ all over India, and provide cheap and efficient _____.
7. New auto rickshaws run on _____ and are environmentally friendly.

Session 1: Two wheelers and Three wheelers

Checklist for Assessment Activity

Use the following checklist to see if you've met all the requirements for Assessment Activity.

Part A

- Differentiate between two wheelers and three wheelers.

Part B

Discussed in class the following:

1. What is meaning of a two wheeler and three wheelers?
2. What are the different types of make of two wheelers?
3. Why we use two wheelers mostly?
4. Why three wheelers are used popularly.

Performance standards/criteria covered by this assessment

Performance standards	Yes	No
Able to draw two wheelers and three wheelers		
Able to distinguish between scooters, mopeds and motorcycles		
Able to identify two wheelers and three wheelers		

Session 2: Passenger Vehicles and Commercial Vehicles

Relevant Knowledge

Passenger Vehicles

Passenger vehicle refers to a machine that can carry a person or a group of persons. There are several types of passenger vehicles like cars/jeeps/tempo etc. you must have seen various models of passenger vehicles in your village, town or city. You must have also travelled in these passenger vehicles.

Some of the popular model of cars, buses, jeep, and tempo are illustrated below:

Car: A motor car or car is a wheeled motor vehicle used for transporting passengers, which also carries its own engine or motor. Various popular cars in India are Maruti Suzuki, Tata motor, Hyundai etc. Now a days various car manufacturers of International level have established in our country and started production of cars etc.



Fig : Photograph of popular four wheelers



Fig : Important passenger vehicle used in our country

Jeep: Jeep was first produced by Willys Overland. Jeep celebrated its 70th anniversary in 2011 and it is the oldest off road vehicle and SUV in the world. Jeep is a marque of Chrysler brand. Jeep is mainly used for its excellent off road capabilities. Jeep was primarily designed and constructed to aid military requirements. Slowly changes were made and the company started producing civilian models. It has gone through various changes under different leaderships. It is part of Chrysler Group LLC which is now part of FIAT Italy. Jeep is found in many countries around the world. The models in the Jeep range are Jeep Grand Cherokee, Jeep Patriot, Jeep Compass, Jeep Liberty, Jeep Commander and Jeep Wrangler.

Commercial Vehicles

A Commercial Vehicle is a type of motor vehicle that may be used for transporting of goods as well as passengers. Commercial vehicles influence the trade, commerce and industry of a country in a major way. Vehicles falling under this category are mainly buses & trucks.

It comes in various uses such as transportation of goods, shipping and handling of various commodities and so on. The future of companies manufacturing these vehicles is very bright due to India's growing commercial sector. The export of commercial vehicles has gone up considerably breaking all previous records.

Trucks are basically used for carrying goods and materials in bulk. These trucks are classified into sub-categories depending on their size and

functional use: haulage, rigid trucks, tippers, cabs, delivery vans and trailers. The fuel efficiency of these vehicles have also improved to a great extent in the past few years. The major players of truck manufacturers in India are Ashok Leyland, Eicher, Tata Motors and Swaraj Mazda.

A Bus is a huge commercial vehicle, said to have originated in France in the year 1826 designed by Stanislas Baudry under the name of 'Omnibus'. The basic purpose of this vehicle is to carry the passengers as it is an easy and cost-effective medium of transport.



Fig : Photograph of popular bus

The major producers of buses in India are Ashok Leyland and Tata Motors, Swaraj Mazda, Volvo and Hindustan Motors have made a big name in manufacturing mini-buses. However, there are huge sub-categories of buses like Commuter Bus, School buses, Electric buses and so on. In India, CNG buses have occupied a huge market thus making it fuel efficient and environmental friendly vehicle.



Fig : Photograph of CNG Buses



Fig : Photograph of popular tempo

Session 2: Passenger vehicle and Commercial Vehicle

Exercise: Assignment

1. List the models of passenger vehicle and commercial vehicle used in your area:

S.No.	Name of model
1.	
2.	
3.	
4.	
5.	
6.	
7.	

2. Observe and identify two types of passenger and commercial vehicles in your area and draw their diagrams

Session 2: Passenger vehicles and Commercial Vehicles

Answer the following questions

(Use additional sheets of paper if necessary)

A. Fill in the blanks

1. A passenger vehicle refers to that run on _____ wheels.
2. Model of cars, buses, jeep, and tempo are _____ in our country every year.
3. Jeep is a _____ vehicle.
4. A Passenger vehicles are used for transporting _____ .
6. Commercial vehicle is used for _____

Session 2: Passenger vehicle and Commercial Vehicle

Checklist for Assessment Activity

Use the following checklist to see if you've met all the requirements for Assessment Activity.

Part A

- Differentiate between passenger vehicle and commercial vehicle.

Part B

Discussed in class the following:

1. Who invented Jeep?
2. What are the different makes of a bus?
3. Why do we use car mostly?
4. Why cars and jeeps are used popularly.

Performance standards/criteria covered by this assessment

Performance standards	Yes	No
Able to draw Passenger vehicles and Commercial Vehicles		
Able to distinguish between Passenger vehicles and Commercial Vehicles		
Able to identify two Passenger vehicles and Commercial Vehicles		

Session 3: Agricultural Vehicles

Relevant Knowledge

You must have seen tractors in your area. Do you know the meaning of tractor? It can be said that a tractor is an engineering vehicle specifically designed to deliver a high attractive effort (or torque) at slow speeds, for the purposes of hauling a trailer or machinery used in agriculture or construction. Most commonly, the term is used to describe a farm vehicle that provides the power and traction to mechanize agricultural tasks, especially (and originally) tillage, but nowadays a great variety of tasks. Agricultural implements may be towed behind or mounted on the tractor, and the tractor, may also provide a source of power if the implement is mechanised.



Fig : Photograph of Tractor

The word *tractor* was taken from Latin, being the agent noun of *trahere* "to pull". The first recorded use of the word meaning "an engine or vehicle for pulling wagons or ploughs" occurred in 1901, displacing the earlier term "traction engine" (1859). Tractors are heavy vehicles serving the purpose of hauling at an extremely low speed. India being one of the major agricultural country, makes the use of tractors on a large scale. It is one of the heaviest vehicle, basically used for carrying out the agricultural tasks in an effective way.

Modern tractors usually employ diesel engines which deliver 18 to 575 horsepower. The major producers of tractors in India are Ashok Leyland, Escorts, Force Motors and Swaraj Enterprise. The most common use of the term "tractor" is for the vehicles used on farms. The farm tractor is used for pulling or pushing agricultural machinery or trailers, for plowing, tilling, disking, harrowing, planting and similar tasks. A variety of specialty farm tractors have been developed for particular uses. These include row crop tractors with adjustable tread width to allow the tractor to pass down rows of corn, tomatoes or other crops. Many utility tractors are used for non-farm



Fig : Photograph of Tractor

grading, landscape maintenance and excavation purposes, particularly with loaders, backhoes, pallet forks and similar devices. Small garden or lawn tractors designed for suburban and semirural gardening and landscape maintenance also exist in a variety of configurations.

The durability and engine power of tractors make them very suitable for engineering tasks. Tractors can be fitted with engineering tools such as dozer blades, buckets, hoes, rippers, etc. The most common attachments for the front of a tractor are dozer blades or buckets. When attached to engineering tools, the tractor is called an engineering vehicle.

Combine Harvester: The combine harvester, or simply combine, is a machine that harvests grain crops. The name derives from the fact that it combines three separate operations, reaping, threshing, and winnowing, into a single process. Among the crops harvested with a combine are wheat, oats, rye, barley, corn (maize), soybeans and flax (linseed). The waste straw left behind on the field is the remaining dried stems and leaves of the crop with limited nutrients which is either chopped and spread on the field or baled for feed and bedding for livestock.



Fig : Photograph of Combine Harvester

Combine harvesters are one of the most economically important labor saving inventions, enabling a small fraction of the population to be engaged in agriculture.



Fig : Photograph of Combine Harvester

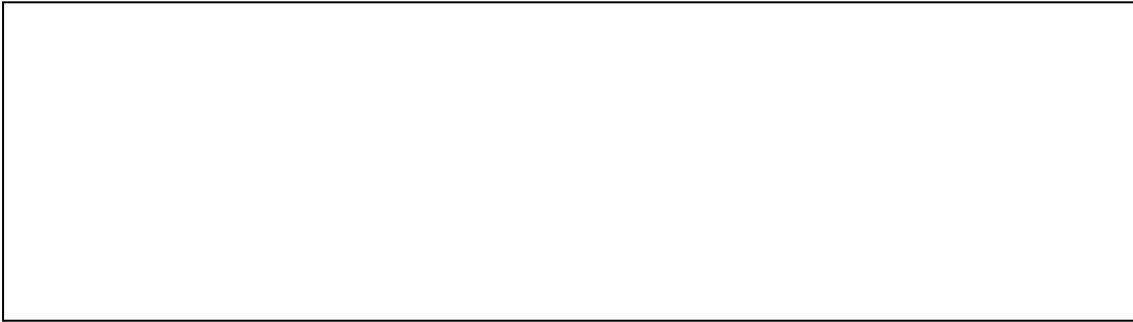
Session 1: Agricultural Vehicles

Exercise: Assignment

- List the models of agricultural vehicles used in your area:

S. No.	Name of model
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

2. Observe and identify two types of agricultural vehicles in your area and draw their diagrams



Session 3: Agricultural vehicles

Answer the following questions

(Use additional sheets of paper if necessary)

A. Fill in the blanks

1. Agricultural _____ may be towed behind or mounted on the tractor
2. An agricultural vehicle refers to that run on _____ wheels.
3. Combines are used for _____ and _____.
4. Advantages of using combine are _____.
5. Combine harvesters are one of the most economically important _____ inventions

Session 3: Agricultural vehicles

Checklist for Assessment Activity

Use the following checklist to see if you've met all the requirements for Assessment Activity.

Part A

- Differentiate between tractors and combines.

Part B

Discussed in class the following:

1. Why a tractor is used?
2. What are the different types of tractors?
3. What are advantages of using combines ?
4. In India, tractors are used popularly.

Performance standards/criteria covered by this assessment

Performance standards	Yes	No
Able to draw tractor		
Able to distinguish between tractor and combine		

Session 4: Construction Equipment Vehicles

Relevant Knowledge

Lot of new roads, houses and plants are being built these days. You must have seen big machines that reach the construction site to dig earth. These are Special Purpose Automobiles and are sometime called Earth Moving Equipments.

There are several types of earthmoving or construction equipments such as;

- Dumpers
- Dozers
- Road rollers
- Tillers
- Excavators

As their various names suggest they are used for various types of work like digging or excavating earth and dumping it at a designated place. Road rollers are used for leveling roads.

Bulldozer : A bulldozer is a crawler (continuous tracked tractor) equipped with a substantial metal plate (known as a blade) used to push large quantities of soil, sand, rubble, or other such material during construction or conversion work and typically equipped at the rear with a claw-like device (known as a ripper) to loosen densely-compacted materials.

Bulldozers can be found on a wide range of sites, mines and quarries, military bases, heavy industry factories, engineering projects and farms.

The term "bulldozer" is often used erroneously to mean any heavy equipment (sometimes a loader and sometimes an excavator), but precisely, the term refers only to a tractor (usually tracked) fitted with a dozer blade. Most often, bulldozers are



Fig : Photograph of bulldozer

large and powerful tracked heavy equipment. The tracks give them excellent ground hold and mobility through very rough terrain. Wide tracks help distribute the bulldozer's weight over a large area (decreasing pressure), thus preventing it from sinking in sandy or muddy ground. Extra wide tracks are known as 'swamp tracks'. Bulldozers have excellent ground hold and a *torque divider* designed to convert the engine's power into improved dragging ability. The Caterpillar D9, for example, can easily tow tanks that weigh more than 70 tons. Because of these attributes, bulldozers are used to clear areas of obstacles, shrubbery, burnt vehicles, and remains of structures. The bulldozer's primary tools are the blade and the ripper.

Road Roller: A road roller (sometimes called a *roller-compactor*, or just *roller*) is a compactor type engineering vehicle used to compact soil, gravel, concrete, or asphalt in the construction of roads and foundations. Similar rollers are used also at landfills or in agriculture. In some parts of the world, road rollers are still known colloquially as steam rollers, regardless of their method of propulsion.

This typically only applies to the largest examples (used for road-making). Road rollers use the weight of the vehicle to compress the surface being rolled (static) or use mechanical advantage (vibrating). Initial compaction of the substrate on a road project is done using a pad foot drum roller, which achieves higher compaction density due to the pads having less surface area.

On large freeways a four wheel compactor with padfoot drum and a blade, such as a Caterpillar 815/825 series machine, would be used due to its high weight, speed and the powerful pushing force to spread bulk material.



Fig : Photograph of Road Roller

Dumper : Dumper is a vehicle designed for carrying bulk material, often on building sites. Dumpers are distinguished from dump trucks by configuration. A Dumper is usually an open 4-wheeled vehicle with the load skip in front of the driver, while a Dump Truck has its cab in front of the load. The skip can tip to dump the load; this is where the name "dumper" comes from. They are normally diesel powered. A towing eye is fitted for secondary use as a site tractor. Dumpers with rubber tracks are used in special circumstances and are popular in some countries.



Fig : Photograph of Dumper

Modern dumpers have payloads of up to 10 tonnes (11 short tons; 9.8 long tons) and usually steer by articulating at the middle of the chassis (pivot steering). They have multi-cylinder diesel engines, some turbocharged, electric start and hydraulics for tipping and steering and are more expensive to make and operate.

Session 4: Construction Equipment Vehicles

Exercise: Assignment

1. List the models of Construction Equipment vehicles used in your area:

S.No.	Name of model
1.	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

2. Observe and identify two types of Construction Equipment vehicles in your area and draw their diagrams



Session 4: Construction Equipment Vehicles

Answer the following questions

(Use additional sheets of paper if necessary)

A. Fill in the blanks

1. A road roller is a _____ type engineering vehicle used to compact soil, gravel, _____ or asphalt in the _____ of roads and foundations.
2. Dumper is a vehicle designed for carrying _____.
3. Dumper is a _____ vehicle.
4. A Construction equipment vehicles are used for _____ .
5. Modern dumpers have payloads of up to _____

Session 4: Construction Equipment Vehicle

Checklist for Assessment Activity

Use the following checklist to see if you've met all the requirements for Assessment Activity.

Part A

- Differentiate between Road Roller and Dumper.

Part B

Discussed in class the following:

1. Role of Dumper.
2. What are the different types of construction equipment vehicle?
3. Why we use Road Roller?
4. Why Bulldozer are used popularly.

Performance standards/criteria covered by this assessment

Performance standards	Yes	No
Able to draw Construction Equipment Vehicles		
Able to distinguish between different Construction Equipment Vehicles		
Able to identify Construction Equipment Vehicles		

Session 5: Special Vehicles

Relevant Knowledge:

Automobile technology has several other applications also. We shall now get acquainted with some of these special applications. You would have all travelled by a Train. Railway locomotive is basically an automobile, but, much bigger than a car, bus or a truck. In the beginning trains were pulled by locomotives which were powered by steam. Now a days, most rail engines run on diesel fuel or electricity. In India, rail is a very important means of transportation of goods and passengers. As you know that, a train cannot run on roads but runs on a railway track.



Fig : Railway Track

Many of you must have also seen big machines which have long extended arms for reaching high rise buildings or top of electric poles. These are mounted on an automobile and the complete machine is called a Crane. Some time you may have seen traffic police using a crane to lift cars which are wrongly parked.



Fig : Figure of Fork Lift

Another interesting application of an automobile is the Fork Lift. A fork lift is used mostly in industry and in large warehouses for carrying components and goods within the premises of the factory or the godown/warehouse. So a fork lift is normally used for carrying goods for very short distances within the four walls of a building but never on the outside road.

When liquids like water, milk, oil, petrol, diesel etc are required to be transported to long distances, it is done in Tankers. These tankers have very big cylinders mounted horizontally on the chassis of a specially built automobile. Capacity of these tankers can vary.

Sometime, you may have seen the sign “inflammable material”. This is a warning sign written on the tankers that carry volatile fluids like petrol & diesel. This warning is to caution people on the road that they should not bring any ignited object like match stick or fire crackers near the tanker. This is because petrol & diesel can catch fire very easily since their flash point is very low and if there is any source of intense heat or ignited objects the tanker can catch fire and cause lot of damage.

It may be noted that sometimes these tankers are also mounted on railway trains. Also you may have seen pictures of tankers on a ship. Pictures of some of important special equipment such as fire brigade, trawler etc have been shown for your reference.



Fig : Photograph of Tanker



Fig : Photographs of Trawler

Session 5: Special vehicles**Exercise: Assignment**

1. List the models of special vehicles used in your area:

S. No.	Name of model
1	
2.	
3.	
4.	
5.	
6.	
7.	
8.	
9.	
10.	

2. Observe and identify two types of Special Vehicle in your area and draw their diagrams



Session 5: Special Vehicles

Answer the following questions

(Use additional sheets of paper if necessary)

A. Fill in the blanks

1. A train is pulled by _____.
2. Train can not run on _____ but on a railway track.
3. Crane is a _____ vehicle.
4. When liquids like water, milk , oil , petrol, diesel etc are required to be transported to _____ distances, it is done in _____ .
5. Fire brigade vehicle is used for_____

Session 5: Special Vehicles

Checklist for Assessment Activity

Use the following checklist to see if you've met all the requirements for Assessment Activity.

Part A

- Differentiate between special vehicles.

Part B

Discussed in class the following:

1. Role of special vehicles
2. What are the different types of cranes?
3. Why we use tankers mostly?
4. Why cranes are used popularly?.

Performance standards/criteria covered by this assessment

Performance standards	Yes	No
Able to draw Special Vehicles		
Able to distinguish between different Special Vehicles		
Able to identify two Special Vehicles		

Suggested Reading

Books

Title	Author	Publisher
Automobile Engineering Vol I	Kirpal Singh	Standard Publishers
Automobile Engineering, Vol II	Kirpal Singh	Standard Publishers
Text Book of Automobile Engineering	R. K. Rajput	Laxmi Publications
Automobile Engineering by,	R. K. Singal	S. K. Kataria and Sons
Automobile Engineering Theory	Kapil Dev	Computech Publications
Automobile Engineering,	K. M. Moeed	S. K. Kataria and Sons

Websites

auto.indiamart.com/auto-technology

www.automobileindia.com/consumer-guide/automobile-technology

auto.indiamart.com/auto-technology

books.google.com/books/about/Automobile_Engineering.html

www.bikeadvice.org

www.wikipedia.com

List of Contributors

1. Mr. Sunil K. Chaturvedi, CEO, Automotive Skills Development Council, Core 4-B 5th Floor India Habitat Centre, Lodhi Road, New Delhi – 110 003
2. Mr. A.C. Deb, Sr. Lecturer, (Auto) – HOD, PUSA Polytechnic PUSA, New Delhi -12
3. Mr. Vikas Gautam, S.B.V. NO.1, Morigate, Delhi – 06,
4. Prof. A.P. Verma, Ex-Prof. & HOD, PSSCIVE, Bhopal.
5. Sh. Deepak Shudhalwar, Assistant Professor, E & T Division, PSSCIVE, Bhopal
6. Dr. Saurabh Prakash, Associate Professor, E & T Division, PSSCIVE, Bhopal – Programme Coordinator