

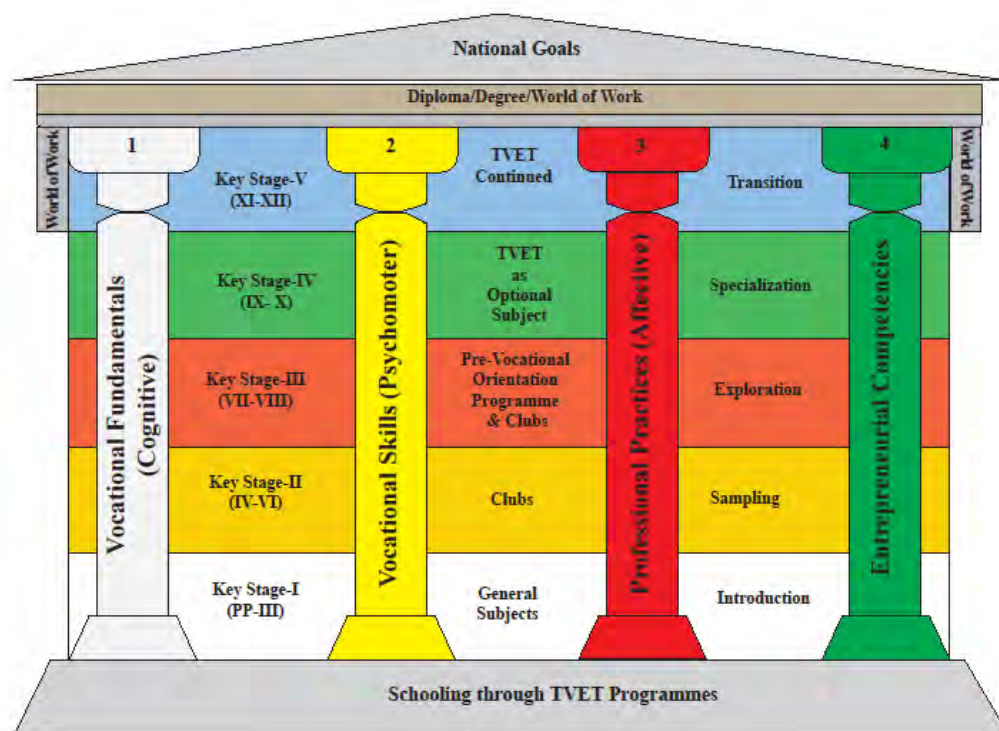
TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING (TVET)

NEW NORMAL CURRICULUM

INSTRUCTIONAL GUIDE

(AUTOMOBILE)

CLASS: XII



Royal Education Council

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FOREWORD

COVID-19 has suddenly caused unforgiving disruptions in the public education all over the world, and brought about threats of fragmentation due to disparities in accessibility and connectivity in many systems. In Bhutan too, continuity of education and learning has been severely affected as a result of nationwide school closures and due to restrictions and health protocols. The disruptions have led to challenges in many existing patterns and trends in education resulting in a massive shift away from learning and teaching in traditional settings with physical interactions to the maximum in terms of relevancy and efficiency. This has caused a major problem for children living in poverty worldwide, who often rely on the physical settings of their schools for educational materials, guidance, and, sometimes, the only decent meal of the day.

In the new normal education, human interaction and well-being is a priority. Technology, particularly digital technology that enables communication, collaboration and learning across distance, is a formidable tool – not a panacea but a source of innovation and expanded potentials. As we embrace this exceptional opportunity to transform the world, and as we reimagine the organization of our educational institutions and learning environments, we will need to think about where we want to go.

In the post COVID 19 era, we must prioritize the development of the whole person not just academic knowledge. Inspiration for the change can be drawn from the 1996 Delors report, *Learning the treasure within*, in its specification of four pillars of learning as “learning to know”, “to do”, “to be”, and “to live together”. Therefore, curricula must be increasingly perceived as an integrated and based on themes and problems that allows learners to learn to live in peace with our common humanity and our common planet. This has the potential in the development of a strong base of knowledge about one’s self and about the world and find purpose and be better able to participate in social and political milieu.

The New Normal Curriculum is, not just a mere response to the pandemic, but also a culmination of the curriculum reform work for the last four years by the Royal Education Council. It is an attempt to transform education from the teaching of “what” to learning of “how” and “why” towards empowering learners with the transversal competencies and the 21st century skills, and preparing them to be lifelong learners. We are optimistic that this move orients our education process towards nurturing nationally rooted and globally competent citizens.

Wish all our learners and teachers a life enriching experiential teaching and learning.

Kinga Dakpa,

Director General

INTRODUCTION

Technical and Vocational Education and Training (TVET) is education and training which provides knowledge and skills for employment. It comprises of education, training and skills development related to a wide range of occupational fields, production, services and livelihood. The Royal Education Council and Ministry of Education envisage that the TVET curriculum has a place in the mainstream education system, as it is the case in most of the education systems of the developed world. The formal Technical and Vocational Education and Training (TVET) began in 1965 at Don Bosco Technical School (DBTS), in Kharbandi (presently known as Rinchening) in Phuntsholing. Even after that, major curriculum reform was planned by the then Department of Curriculum Research and Development (DCRD) under the Ministry of Education in an attempt to make education relevant to the Bhutanese society through diversification of Secondary Education Curriculum in the schools, which included the introduction of TVET.

As per ‘National Education Framework’ developed collaboratively by the Royal Education Council (REC) and the Ministry of Education (MoE), it provides a pathway on integrating technical/vocational education in the mainstream school education curriculum and as elective subjects in higher classes (NEF, 2009; page 64).

With the collaborative efforts of the Ministry of Labour and Human Resources and the erstwhile Department of Curriculum Research and Development under Ministry of Education, Vocational Curriculum has been introduced in the schools with assistance from TTIs since 2011. After the first MoU that was signed between MoE and MoLHR in 2011, the second MoU was signed again in 2014, to improve technical/vocational courses. The technical/vocational courses offered by the TTIs/IZCs are adapted and redesigned and are offered in schools aligning to the ‘Bhutan Education Blue Print’ 2014-2024, which recommends upscaling and diversification of TVET in schools through the provision of alternative pathways in schools and the tertiary education systems, owing to the limited access to such courses, despite the growing demand for technical skills in the country.

The resolutions of the National School Curriculum Conference 2016, also strongly emphasised the need to upscale and deepen TVET. Accordingly, the TVET framework is developed from classes PP to XII, schools equipped with necessary resources and instructors trained. Tripartite MoU among REC, MoE and MoLHR was also signed in 2018 to implement the programmes collaboratively.

Although the TVET curriculum is competency based with more emphasis on hands-on experience, further improvements have been made taking care of cognitive and affective domains besides psychomotor. Teaching and learning approaches have also been enriched with the recommendation to use ICT and online resources. Since the pandemic (COVID-19) has resulted in the closure of schools, it has taught us lessons to be prepared for such an untoward situation in the future. Thus, the New Normal Curriculum Instructional Guide is prepared not only to encourage blended learning but also to facilitate remote learning. Thus, the guide would help the schools to implement the curriculum effectively without limiting to contact teaching/learning besides using a variety of pedagogies.

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MODULE V: OVERHAULING POWER OR DRIVE TRAIN

Chapter 1: Servicing Propeller shaft components

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
1.1.1 Define propeller shaft. 1.1.2 List components of power train. 1.1.3 Explain transmission power flow mechanism. 1.1.4 Define propeller shaft. 1.1.5 State function of propeller shaft. 1.1.6 List types of propeller shaft. 1.1.7 Explain purpose of slip joint. 1.1.8 List components of propeller shaft and their functions. 1.1.9 Ensure to place saddle in correct position when lifting the vehicle. 1.1.10 Change propeller shaft.	1.1 Changing propeller shaft

B. Competencies:

- i. Install a propeller shaft and eliminate the faults in any type of vehicle.

C. Pedagogy/Learning Experiences

- **Contact:**

- ✓ Read and explain the INFORMATION SHEET 1.1 using PPT, handouts, group discussion, and presentation.
- ✓ Invite guest lecturers often to teach the learners.
- ✓ Demonstrate the OPERATION SHEET 1.1 and let the learners perform according to the DEMO++ performance guide
- ✓ Let the learners solve the SAMPLE SELF CHECK 1.1

- **Non-contact:**

- ✓ Let the learners read the INFORMATION SHEET 1.1.
- ✓ Let them go through OPERATION SHEET 1.1.
- ✓ Provide handouts and PPT slides to learners through Google Classroom or any other social media platforms.
- ✓ An instructor may provide the web link <https://www.youtube.com/watch?v=y8QaD8NjLxM> that explains the parts of the propeller shaft.
- ✓ Share the link <https://www.youtube.com/watch?v=dQwGJYayfNM> to learn about how the drive shaft functions.

D. Assessment:

- **Contact:**
 - ✓ Make learners to perform OPERATION SHEET 1.1
 - ✓ Ask learners to solve the SAMPLE SELF CHECK 1.1 and give additional questions from CBLM and other resources-Google/YouTube.
 - ✓ Conduct class tests and viva after practical classes.
 - ✓ Assess the learners’ ability to perform OPERATION 1.1 after the demonstration as per the standard procedures.
- **Non-contact:**
 - ✓ Ask learners to solve the SAMPLE SELF CHECK 1.1 and send the answers through Google Classroom or any other social media platforms.
 - ✓ Give additional questions from CBLM and other resources-Google/YouTube and let learners submit answers through any social media platforms.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for Classes XII
- ✓ Handouts
- ✓ <https://www.youtube.com/watch?v=y8QaD8NJLxM> (Parts of propeller shaft).
- ✓ <https://www.youtube.com/watch?v=dQwGJYayfNM> (How the drive shaft functions).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
1.2.1 Explain the purpose of checking propeller shaft run out.	1.2 Checking propeller shaft run out
1.2.2 Explain the function of counterweight on the propeller shaft.	
1.2.3 Check propeller shaft run out	

B. Competencies:

- i. Identify the runouts on the propeller shaft and measure by using a dial gauge as per the job requirement.

C. Learning Experience

- **Contact:**
 - ✓ Let the learners read and explain the INFORMATION SHEET 1.2 in a group using board, PPT, and charts.
 - ✓ Demonstrate and make the learners perform OPERATION SHEET 1.2 according to the DEMO++ performance guide.
 - ✓ Let the learners solve the SAMPLE SELF CHECK 1.2
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 1.2.
 - ✓ Let them go through OPERATION SHEET 1.2.

- ✓ Let the learners solve SAMPLE SELF CHECK 1.2 and write the notes after receiving every learning material and submit through Google Classroom.
- ✓ Make the learners go through this web link <https://www.youtube.com/watch?v=h554hxSDHAs> to learn how to check the driveshaft runout using a dial gauge.

D. Assessment:

- **Contact:**
 - ✓ Assess the learners' ability to perform OPERATION SHEET 1.2 using a practical checklist and rubrics.
 - ✓ Ask learners to solve the SAMPLE SELF CHECK 1.2.
 - ✓ The learners should use appropriate PPE before the practical works are started.
 - ✓ Conduct class tests and viva.
- **Non-contact:**
 - ✓ Ask learners to solve the SAMPLE SELF CHECK 1.2 from CBLM and send the answers through Google Classroom or any other social media platforms.
 - ✓ Give questions from CBLM and other resources-Google/YouTube and let learners submit answers through Google Classroom.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for Class XII
- ✓ <https://www.youtube.com/watch?v=h554hxSDHAs> (Checking the driveshaft runout using dial gauge).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
1.3.4 State function of cross-bearing. 1.3.5 List universal joint. 1.3.6 List parts of cross-bearing. 1.3.7 Change cross-bearing <i>Note:</i> ✓ <i>Ensure to use hand gloves.</i>	1.3 Changing cross bearing

B. Competencies:

- i. Eliminate faults regarding the drive shaft in any vehicle by replacing the cross-bearing as per the standard procedures.

C. Pedagogy/Learning Experiences:

- **Contact:**
 - ✓ Explain the INFORMATION SHEET 1.3
 - ✓ Demonstrate and let the learners' OPERATION SHEET 1.3
 - ✓ Let them solve SAMPLE SELF CHECK 1.3
 - ✓ Use handout and PPT.

- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 1.3
 - ✓ Let them go through OPERATION SHEET 1.3
 - ✓ Let them solve SAMPLE SELF CHECK 1.3
 - ✓ Based on the information obtained from the web link or relevant materials, the learner should be able to answers the questions uploaded in the Google classroom and SAMPLE SELF CHECK 1.3 from the textbook.
 - ✓ Let the learners follow the link and explore functions, working, and parts of universal joint <https://www.youtube.com/watch?v=LCMZz6YhbOQ>.
 - ✓ Share the link https://www.bluestar.com/get_informed/article/universal-u-joints-axle-driveshaft/ with more explanation on a universal joint.

D. Assessment:

- **Contact:**
 - ✓ Asses the notes, practical reports, and homework after the completion of INFORMATION SHEET 1.3 and OPERATION SHEET 1.3
 - ✓ Assess the learners’ ability to perform OPERATION SHEET 1.3 according to the practical checklist and rubrics.
- **Non-contact:**
 - ✓ Let the learners solve SAMPLE SELF CHECK 1.3 and assess their answers submitted through google classroom.
 - ✓ Assessment of the work (assignments, notes, question/ answer) submitted through telegram, WeChat, Messenger, and google classroom.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII.
- ✓ Handouts.
- ✓ <https://www.youtube.com/watch?v=LCMZz6YhbOQ> (Functions, working, and parts of the universal joint).
- ✓ https://www.bluestar.com/get_informed/article/universal-u-joints-axle-driveshaft/ (Universal joint).

A. Learning objectives/ Broad theme / Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
1.4.8 State function of center bearing. 1.4.9 Explain the construction of center bearing. 1.4.10 Ensure to use hand gloves. 1.4.11 <i>Change center bearing.</i>	1.4 Changing center bearing

B. Competencies:

- i. Replace the centre bearing and tighten with specific torque as per standard procedures in any vehicle.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Read and explain the INFORMATION HSEET 1.4 using PPT, handouts, and CBLM.
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 1.4
 - ✓ Take learners to nearby TTIS(TTI, Samthang) to perform OPERATION SHEET 1.4 with the help of TTI instructors.
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 1.4.
 - ✓ Let them go through OPERATION SHEET 1.4.
 - ✓ Let the learners solve and submit SAMPLE SELF CHECK 1.4, additional questions and write notes on resources provided to them through Google Classroom or any other social media platforms.
 - ✓ Conduct an online quiz.
 - ✓ Share the link <https://www.youtube.com/watch?v=b2P14XdaKSM> to understand how to replace the center bearing.
 - ✓ Share the link <https://www.youtube.com/watch?v=dQwGJYayfNM> to learn about how the center bearing functions.

D. Assessment:

- **Contact:**
 - ✓ As soon as the learners are aware of center bearing, ask them to solve the SAMPLE SELF CHECK 1.4.
 - ✓ Conduct class tests by framing the questions from CBLM and other ICT resources.
 - ✓ Assess the learner's ability to perform OPERATION SHEET 1.4 using a performance guide and rate them as per the rubrics, etc. Provide necessary feedback and intervention based on an assessment of the model.
- **Non-contact:**
 - ✓ Let learners solve the SAMPLE SELF CHECK 1.4 from CBLM and send the answers through Google Classroom or any other social media platforms.
 - ✓ Give questions using different sources and let them submit answers through Google classroom.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for Class XII
- ✓ Handouts and Powerpoint presentation.
- ✓ <https://www.youtube.com/watch?v=b2P14XdaKSM> (Procedure to replace center bearing).
- ✓ <https://www.youtube.com/watch?v=dQwGJYayfNM> (How the center bearing functions).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning Objectives	Core Concepts(Chapters/topic)
1.the 5.1 Explain the symptoms, causes, and remedies of Propeller shaft failure. 1.5.2 Troubleshoot propeller shaft failure.	1.5 Troubleshooting propeller shaft failure

B. Competencies:

- i. Identify the symptoms/failure of the propeller shaft as per the troubleshooting procedures in any vehicle.

C. Pedagogy/Learning Experiences

- **Contact:**
 - ✓ Explain the INFORMATION SHEET 1.5 and let them take note while explaining.
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 1.5: on troubleshoot propeller shaft failure.
 - ✓ Let the learners solve SAMPLE SELF CHECK 1.5
 - ✓ Let the learners solve SAMPLE SELF CHECK 1.5
 - ✓ Use PPT and handouts.
- **Non-contact**
 - ✓ Let the learners read the INFORMATION SHEET 1.5
 - ✓ Let them go through OPERATION SHEET 1.5
 - ✓ Let the learners solve SAMPLE SELF CHECK 1.5
 - ✓ Let them go through the learning materials provided to them such as PPT slides, CBLM, and handouts.
 - ✓ Provide the link <https://www.youtube.com/watch?v=tpkkg3J73dY> & <https://www.youtube.com/watch?v=iDPp0MqR2bc> to learn about symptoms/problems of driveshaft failures.

D. Assessment:

- **Contact:**
 - ✓ Assess the learners' notes taken in classrooms, homework, and classwork as per the rubrics.
 - ✓ Conduct class tests, group presentations, and viva.
 - ✓ Assess the learners' ability to perform OPERATION SHEET 1.5 after demonstration as per the practical checklist and rubrics.
- **Non-contact:**
 - ✓ Let the learner write a brief note on symptoms, causes, and remedies of propeller shaft after going through the learning materials provided to them and submit through Google Classroom.
 - ✓ Asses the given question & answers and notes submitted through social medias (Telegram, WeChat, Google Classroom, Messenger, and Whatsapp).

- ✓ Conduct an online quiz.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for classes XII.
- ✓ Handouts
- ✓ <https://www.youtube.com/watch?v=tpkkg3J73dY> & <https://www.youtube.com/watch?v=iDPp0MqR2bc> (Symptoms/ problems of driveshaft failures).

Chapter 2: Servicing wheel bearing and axle shaft components

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
2.1.1 State function of the wheel bearing. 2.1.2 List types of the wheel bearing. 2.1.3 Explain the construction of wheel bearing assembly. 2.1.4 Explain components of the wheel hub assembly and their functions. 2.1.5 Explain the purpose of hub greasing. 2.1.6 Explain the purpose of bearing preload. 2.1.7 Overhaul wheel hub assembly. <i>Note:</i> <ul style="list-style-type: none"> ✓ Use of preload gauge. ✓ Ensure proper disposal of used grease. ✓ Ensure to use hand gloves. 	2.1 Overhauling wheel hub assembly

B. Competencies:

- Eliminate the defects in the wheel hub as per the requirement.
- Adjust the wheel bearing preload to the required torque as per the specification in the service manual book of a particular vehicle.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Read and explain the INFORMATION SHEET 2.1
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 2.1
 - ✓ Let them solve the SAMPLE SELF CHECK 2.1
 - ✓ Use PPT, handouts, display pictures (hub greasing), and short video clips (how to give preload).
- **Non-contact:**
 - ✓ Read the learners read INFORMATION SHEET 2.1
 - ✓ Let them go through the OPERATION SHEET 2.1
 - ✓ Let them solve the SAMPLE SELF CHECK 2.1

- ✓ Provide handouts and DEMO++performance guide through google classroom, WeChat, etc.
- ✓ Provide the web link <https://www.nationalprecision.com/info-library/technical-data/bearing-preload/> that defines and explains the importance of preload.

D. Assessment:

- **Contact:**
 - ✓ Conduct class tests, presentations, and viva to rate their understanding as per rubric.
 - ✓ Assess the learners’ ability to explain and perform OPERATION SHEET 2.1 as per the practical checklist and rubrics.
- **Non-contact:**
 - ✓ Let the learners go through the links provided and assess the notes submitted through Google Classroom or any other social media platforms.
 - ✓ Upload a question through possible social media platforms from the provided handouts, CBLM, and assess their answers.
 - ✓ Let the learners answer the SAMPLE SELF CHECK 2.1 and submit them through Google Classroom, etc.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII
- ✓ PPT, handouts, display pictures (hub greasing), and short video clips (how to give preload).
- ✓ <https://www.nationalprecision.com/info-library/technical-data/bearing-preload/> (Explanation on bearing preload).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
2.2.1 State function of the axle. 2.2.2 List types of axles. 2.2.3 Illustrate construction of drive axle. 2.2.4 List types of the axle shaft. 2.2.5 State function of the axle shaft. 2.2.6 Explain the purpose of inspecting the axle shaft. 2.2.7 Replace drive/axle shaft. <i>Note:</i> <ul style="list-style-type: none"> ✓ <i>Ensure proper disposal of used lubricants.</i> ✓ <i>Ensure to use hand gloves.</i> 	2.2 Replacing drive/axle shaft

B. Competencies:

- i. Replace the axle shaft in any vehicle without damaging axle shaft splines.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Read and explain the INFORMATION SHEET 2.2
 - ✓ Demonstrate and let the learners OPEARRTION SHEET 2.2
 - ✓ Let them solve SAMPLE SELF CHECK 2.2
 - ✓ Use posters, display the pictures (types of axle shaft), PPT, and short video clips (how does axle shaft transmit the power from the final drive gear to wheels).
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 2.2.
 - ✓ Let them go through OPERATION SHEET 2.2.
 - ✓ Let them solve SAMPLE SELF CHECK 2.2
 - ✓ Provide handouts.
 - ✓ Provide the link <https://www.youtube.com/watch?v=RoAxNmGmGus> that explains the function & types of the axle.
 - ✓ Provide the link <https://drivesmartwarranty.com/car-center/resources/did-you-know/what-is-a-drive-axle#section11> that explains the axle shaft components.

D. Assessment:

- **Contact:**
 - ✓ Assess the learner's ability to identify the types of axles used in any type of vehicle.
 - ✓ Assess the learners' ability to perform OPEARRTION SHEET 2.2 using a practical checklist and rubrics.
 - ✓ Conduct class tests, viva, presentations, and practical exams to assess their performance as per the rubrics.
 - ✓ Check their notebooks and practical reports.
- **Non-contact:**
 - ✓ Assess their notes or the task assigned to them based on the links, videos, handouts, etc provided through possible social media platforms.
 - ✓ Let them do the SAMPLE SELF CHECK 2.2 and submit through google classroom or any other social media platforms.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for classes XII
- ✓ Posters, pictures (types of axle shaft), PPT, and short video clips (how does axle shaft transmit the power from the final drive gear to wheels).
- ✓ <https://www.youtube.com/watch?v=RoAxNmGmGus> (function and types of the axle).
- ✓ <https://drivesmartwarranty.com/car-center/resources/did-you-know/what-is-a-drive-axle#section11> (Axle shaft components).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topics)
2.3.1 State function of the CV joint. 2.3.2 List types of the CV joint. 2.3.3 Explain the construction of the CV joint. 2.3.4 Explain the operation of the CV joint. 2.3.5 <i>Change CV joint.</i> <i>Note:</i> ✓ <i>Ensure use of hand gloves.</i>	2.3 Changing CV joint

B. Competencies:

- i. Determine the faults of CV joint and are replaced whenever required in any vehicle as per service manual.

C. Pedagogy/Learning experiences:

• **Contact:**

- ✓ Let the learners discuss in a group and present the INFORMATION SHEET 2.3 using PPT and illustrated talk (showing the pictures related to a particular topic).
- ✓ Demonstrate and let the learners perform OPERATION SHEET 2.3 as per the DEMO++ performance guide.
- ✓ Let them solve SAMPLE SELF CHECK 2.3

• **Non-contact:**

- ✓ Let the learners read the INFORMATION SHEET 2.3
- ✓ Let them go through OPERATION SHEET 2.3
- ✓ Let them solve SAMPLE SELF CHECK 2.3
- ✓ Provide handouts.
- ✓ Provide the link <https://www.youtube.com/watch?v=vFVgOZI4Sqs> and <https://www.youtube.com/watch?v=auQ65qno2Eo> shows the construction and working of the CV joint.
- ✓ Share the link [hshare ttps://drivesmartwarranty.com/car-center/resources/did-you-know/what-is-a-drive-axle#section11](https://drivesmartwarranty.com/car-center/resources/did-you-know/what-is-a-drive-axle#section11) that explains the wheel hub and axle shaft component.

D. Assessment:

• **Contact:**

- ✓ Assess the learners' ability to identify and operate different types of the grinder.
- ✓ Discuss the SAMPLE SELF CHECK 2.3 in the classroom.
- ✓ Conduct the class test for theoretical as well as practical.
- ✓ Asses the end product of learners after performing the OPERATION SHEET 2.3.

- **Non-contact:**
 - ✓ Let the learners write and submit the notes on the provided learning materials and SAMPLE SELF CHECK 2.3 answers through Google Classroom or any other social media platforms.
 - ✓ Conduct an online quiz.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII
- ✓ Handouts.
- ✓ <https://www.youtube.com/watch?v=vFVgOZI4Sqs>
- ✓ <https://www.youtube.com/watch?v=auQ65qno2Eo> (Construction of CV joint).
- ✓ <https://drivesmartwarranty.com/car-center/resources/did-you-know/what-is-a-drive-axle#section11> (Wheel hub and axle shaft components).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
2.4.1 Explain symptoms, causes, and remedies of wheel bearing failure. 2.4.2 Troubleshoot wheel hub assembly.	2.4 Troubleshooting wheel hub assembly

B. Competencies:

- Diagnose the faults and defects in the wheel hub as per the checklist.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Let the learners discuss in the group and present INFORMATION SHEET 2.4 using PPT, board, display pictures of the defects of wheel hub components.
 - ✓ Let the perform OPERATION SHEET 2.4 according to the performance guide.
 - ✓ Let the learners perform the JOB SHEET 2.4
 - ✓ Let the learners solve SAMPLE SELF CHECK 2.4
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 2.4.
 - ✓ Let them go through OPERATION SHEET 2.4.
 - ✓ Let the learners solve SAMPLE SELF CHECK 2.4
 - ✓ Provide handouts and pictures (defects of wheel hub parts).

D. Assessment:

- **Contact:**
 - ✓ Conduct the class test and viva, let the learners do a presentation, check their notes book and practical reports after every session.
 - ✓ Assess the learners' ability to diagnosed the faults and defects of the wheel hub as per the practical checklist.

- **Non-contact:**
 - ✓ Assess the answers of SAMPLE SELF CHECK 2.4 submitted online.
 - ✓ Upload the case study through Google Classroom or any other social media platforms and assess their understanding as per the rubrics.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII.
- ✓ Pictures (defects of wheel hub components), short video clips (on hub greasing), and case study.

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
2.5.1 Explain symptoms causes and remedies of drive/axle shaft failure. 2.5.2 troubleshoot drive/axle shaft failure.	2.5 Troubleshooting drive/axle shaft failure.

B. Competencies:

- Identify the possible faults of drive or axle shaft components through a road test and visual inspection in any vehicle.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Read and explain the INFORMATION SHEET 2.5
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 2.5
 - ✓ Let the learners solve SAMPLE SELF CHECK 2.5
 - ✓ Use PPT, handouts, short video clips (the procedure to troubleshoot axle shaft).
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 2.5.
 - ✓ Let them go through OPERATION SHEET 2.5.
 - ✓ Let the learners solve SAMPLE SELF CHECK 2.5
 - ✓ Provide notes/ handouts and short video clips (the procedure to troubleshoot axle shaft).
 - ✓ Share the link <https://www.youtube.com/watch?v=tpkkg3J73dY&t=12s> that explains the symptoms of failing drive shaft.

D. Assessment:

- **Contact:**
 - ✓ Conduct the class test to assess their understanding.
 - ✓ Assess the learners' report on particular practical OPERATION SHEET 2.5 according to the rubrics.
 - ✓ Assess the learners' ability to perform OPERATION SHEET 2.5 as per the practical checklist and rubrics.

- **Non-contact:**
 - ✓ Let the learners write the notes, answer the SAMPLE SELF CHECK 2.5 after going through the learning materials provided to them via Google Classroom or any other possible social media platforms, and assess their understanding as per the rubrics.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII.
- ✓ Handouts, short video clips (The procedure to troubleshoot axle shaft).
- ✓ <https://www.youtube.com/watch?v=tpkkg3J73dY&t=12s> (Symptoms of failing driveshaft).

Chapter 3: Servicing final drive and differential Components

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
3.1.1 Explain changing interval of differential oil. 3.1.2 Explain specification of differential oil. 3.1.3 State function of differential oil. 3.1.4 Explain the classification of differential oil. 3.1.5 Change differential oil <i>Note:</i> ✓ <i>Ensure to use hand gloves.</i>	3.1 Changing differential oil

B. Competencies:

- Change the differential gear oil of specified grading as per the standard procedure at any time in any vehicle based on the service manual.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Let the learners discuss the INFORMATION SHEET 3.1 in a group and present in the class.
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 3.1
 - ✓ Let them solve SAMPLE SELF CHECK 3.1
 - ✓ Use PPT, pictures (types of differential gear oil), DEMO++ performance guide, demonstration, and short video clips (the procedure to change oil).
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 3.1.
 - ✓ Let them go through OPERATION SHEET 3.1.
 - ✓ Let them solve SAMPLE SELF CHECK 3.1
 - ✓ Provide handouts, DEMO++ performance guide, and pictures (types of differential gear oil).
 - ✓ Provide the link <https://www.youtube.com/watch?v=RGTBee4x8p8> demonstrates how to change differential oil.
 - ✓ Provide the link <https://gcoclubewest.ca/what-is-differential-oil-how-does-it-work/> that explains more about differential oil.

D. Assessment:

- **Contact:**
 - ✓ Assess the learners’ ability to perform OPERATION SHEET 3.1 as per the practical checklist and rubrics.
 - ✓ Let the learners answer the SAMPLE SELF CHECK 3.1.
 - ✓ Assess the learners’ comprehension by conducting the class test, group presentation, and quiz as per the rubrics.
 - ✓ Asses the notes and assignments maintained by the learners after every lesson.
- **Non-contact:**
 - ✓ Let them write and submit the notes based on the learning resources.
 - ✓ Assess the answers of SAMPLE SELF CHECK 3.1 and additional questions are given to them through Google Classroom or any other social media platforms.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for classes IX-X, REC
- ✓ Handouts, PPT, DEMO++ performance guide, and short video clips (types of differential gear oil).
- ✓ <https://www.youtube.com/watch?v=RGTBee4x8p8> (How to change differential oil).
- ✓ <https://gcoclubewest.ca/what-is-differential-oil-how-does-it-work/> (Explanation on differential oil).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
3.2.1 Define final drive. 3.2.2 Define differential. 3.2.3 List types of differential. 3.2.4 State function of the final drive. 3.2.5 State function of differential. 3.2.6 Explain the application of differential. 3.2.7 Replace differential assembly <i>Note:</i> <ul style="list-style-type: none">✓ <i>Ensure proper jacking position of the vehicle.</i>✓ <i>Ensure to use hand gloves.</i>	3.2 Replacing differential assembly

B. Competencies:

- i. Determine the faults and replace differential assembly in any vehicle as per the job requirement.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Explain the INFORMATION SHEET 3.2
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 3.2
 - ✓ Let them solve SAMPLE SELF CHECK 3.2

- ✓ Use PPT, handouts, demonstration, and short video clips (functions of differential assembly).
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 3.2.
 - ✓ Let them go through OPERATION SHEET 3.2.
 - ✓ Let them solve SAMPLE SELF CHECK 3.2
 - ✓ Give handouts, short video clips, and the DEMO++ performance guide.
 - ✓ Provide the link <https://www.youtube.com/watch?v=SOgoejxzF8c> that shows the functions and working of differential assembly.

D. Assessment:

- **Contact:**
 - ✓ Let the learners do the presentation, viva to assess their comprehension as per the rubrics.
 - ✓ Assess the learners’ notes, assignments, and practical reports frequently.
 - ✓ Assess the ability of learners to determine the defects of differential and replace as per the standard procedures.
 - ✓ Assess the learners’ ability to explain the INFORMATION SHEET 3.2 and perform OPERATION SHEET 3.2 as per the practical checklist and rubrics.
- **Non-contact:**
 - ✓ Let the learners solve and submit answers of SAMPLE SELF CHECK 2.3 through g Google Classroom or any other social media platforms.
 - ✓ Let the learners write and submit a succinct note based on their understanding after watching the videos, going through the handouts, and CBLM.
 - ✓ Conduct an online quiz.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII.
- ✓ Handouts, PPT, and short video clips (functions of differential assembly).
- ✓ <https://www.youtube.com/watch?v=SOgoejxzF8c> (Function and working of differential).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
3.3.8 List types of the final drive gear	3.3 Disassembling differential assembly
3.3.9 Explain the construction of differential	
3.3.10 Explain the working principle of differential	
3.3.11 Explain differential gear ratio	
3.3.12 State purpose of lock plates	
3.3.13 State function of oil seal	
3.3.14 Use bearing puller	
3.3.15 Disassemble differential assembly.	

Note:

- ✓ *Ensure to use hand gloves*

B. Competencies:

- i. Dismantle the differential assembly sequentially following the correct procedure and identified the defective parts through visual inspection as per the job requirement.

C. Pedagogy/Learning experiences:

• **Contact:**

- ✓ Read and explain the INFORMATION SHEET 3.3 using handouts, PPT, and short video clips (working principle of differential).
- ✓ Demonstrate and let the learners perform OPERATION SHEET 3.3 as per the DEMO++ performance guide.
- ✓ Let them solve SAMPLE SELF CHECK 3.3

• **Non-contact:**

- ✓ Let the learners read the INFORMATION SHEET 3.3
- ✓ Let them go through OPERATION SHEET 3.3
- ✓ Let them solve SAMPLE SELF CHECK 3.3
- ✓ Provide short video clip (working principle of differential), handouts, pictures (differential parts), PPT, DEMO++ performance guide, and case study.
- ✓ Provide a link <https://www.youtube.com/watch?v=nC6fsNXdcMQ> that explains the working principle of differential assembly.

D. Assessment:

• **Contact:**

- ✓ Assess the learner's ability to perform OPERATION SHEET 3.3 as per the rubrics developed.
- ✓ Assess the practical report on OPERATION SHEET 3.3 written in their practical book as per the rubrics.
- ✓ Let the learners solve the SAMPLE SELF CHECK 3.3 and note to assess their comprehension.
- ✓ Check the learner note that has been jot down while teaching frequently.
- ✓ Conduct class tests and viva.

• **Non-contact:**

- ✓ Let the learners solve the SAMPLE SELF CHECK 3.3, notes, etc to assess their understanding based on the learning materials provided to them.
- ✓ Conduct online quizzes and virtual viva through any possible social media platforms.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for classes XII
- ✓ Handouts, short video clips (working principle of differential), PPT, and DEMO++ performance guide.

- ✓ <https://www.youtube.com/watch?v=nC6fsNXdcMQ> (Working principle of differential assembly).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
3.4.1 Assemble differential assembly <i>Note:</i> <ul style="list-style-type: none"> ✓ <i>Ensure to use hand gloves.</i> ✓ <i>Ensure to take care of drained gear oil.</i> 	3.4 Assembling differential assembly

B. Competencies:

- i. Disassemble the differential assembly to identify the defects and assemble as per the standard procedures at any time.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Explain the INFORMATION SHEET 3.4
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 3.4 as per the DEMO++ performance guide.
 - ✓ Let them solve SAMPLE SELF CHECK 3.4
 - ✓ Use handouts, CBLM, pictures (apply bearing preload and to adjust gear backlash), PPT, DEMO++ performance guide, and demonstration.
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 3.4
 - ✓ Let them go through OPERATION SHEET 3.4
 - ✓ Let them solve SAMPLE SELF CHECK 3.4
 - ✓ Provide short video clips, pictures (apply bearing preload and adjust gear backlash), DEMO++ performance guide, and handouts.
 - ✓ Provide link <https://www.youtube.com/watch?v=d9cxw9d-css> how to set differential gear backlash.

D. Assessment:

- **Contact:**
 - ✓ Assess their understanding of the lesson through the notes, class test, and question/answer session.
 - ✓ Assess the learners' ability to perform OPERATION SHEET 3.4 using observation checklist and rubrics as per the standard procedures.
 - ✓ Asses the report written in their practical notebook after performing OPERATION SHEET 3.4.
- **Non-contact:**
 - ✓ Give additional questions to SAMPLE SELF CHECK 3.4, assignments, conduct online quiz, and assess the answers using rubrics.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII
- ✓ Handouts.
- ✓ <https://www.youtube.com/watch?v=d9cxw9d-css> (How to set differential gear backlash).
- ✓ <https://www.youtube.com/watch?v=PrbWIAzoIII> (How to apply side bearing preload).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
3.5.1 Define bearing pre load. 3.5.2 State purpose of bearing pre load. 3.5.3 Adjust tail pinion bearing preload. <i>Note:</i> ✓ <i>Ensure to use hand gloves.</i>	3.5 Adjusting tail pinion bearing preload

B. Competencies:

- i. Apply the tail pinion bearing preload as per the requirement at any time for any vehicle.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Let the learners discuss INFORMATION SHEET 3.5.
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 3.5 as per the standard procedure using the DEMO++ performance guide.
 - ✓ Let them solve the SAMPLE SELF CHECK 3.5
 - ✓ Use handouts, CBLM and PPT.
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 3.5.
 - ✓ Let them go through OPERATION SHEET 3.5.
 - ✓ Let them solve the SAMPLE SELF CHECK 3.5
 - ✓ Provide handouts, DEMO++ performance guide, and short video clips (Adjust tail pinion bearing preload).
 - ✓ Give a link <https://www.youtube.com/watch?v=ID8QNQATrNs> that shows how to set pinion bearing preload.

D. Assessment:

- **Contact:**
 - ✓ Conduct class tests, presentations, and question/ answer sessions.
 - ✓ Give additional questions on SAMPLE SELF CHECK 3.5 and assess their answers.
 - ✓ Assess the learners' ability to perform the OPERATION SHEET 3.5 as per the rubrics and practical checklist.

- **Non-contact:**
 - ✓ Let the learners write a note and solve the SAMPLE SELF CHECK 3.5 with additional questions given from the learning materials provided to them and submit through any possible social media platforms.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII
- ✓ Handouts, short video clips (Adjust tail pinion bearing preload), and DEMO++ performance guide.
- ✓ <https://www.youtube.com/watch?v=ID8QNQATrNs> (How to set pinion bearing preload).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
3.6.1 Define backlash. 3.6.2 State purpose of backlash. 3.6.3 Explain gear tooth nomenclatures and gear contact pattern. 3.6.4 Use SST (Differential side bearing adjuster). 3.6.5 Adjust differential backlash. <i>Note:</i> ✓ <i>Ensure to use hand gloves.</i>	3.6 Adjusting differential backlash

B. Competencies:

- Ajust the differential gear backlash as per the requirement at any time for any vehicle.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Read and explain the INFORMATION SHEET 3.6 using PPT, handout, and short video clips (adjustment of differential gear backlash).
 - ✓ Demonstrate and let them perform OPERATION SHEET 3.6 as per the DEMO ++ performance guide.
 - ✓ Let them solve the SAMPLE SELF CHECK 3.6
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 3.6.
 - ✓ Let them go through OPERATION SHEET 3.6.
 - ✓ Let them solve the SAMPLE SELF CHECK 3.6
 - ✓ Provide PPT, handouts, DEMO ++ performance guide, and short video clips (adjustment of differential gear backlash).
 - ✓ Provide link <https://www.youtube.com/watch?v=d9cxw9d-css> how to set differential gear backlash.

- ✓ Provide the link <https://www.youtube.com/watch?v=PrbWIAzoIII> that shows how to apply side bearing preload.

D. Assessment:

- **Contact:**

- ✓ Conduct class tests and develop rubrics to rate every learner’s presentation, notes written in their book, practical reports, etc.
- ✓ Let them solve the SAMPLE SELF CHECK 3.6 and assess their answers accordingly.
- ✓ Assess the learners’ ability to determine the defects of strut assembly and perform the OPERATION SHEET 3.6.

- **Non-contact:**

- ✓ Let them solve the SAMPLE SELF CHECK 3.6 and assess their answers accordingly.
- ✓ Share different learning materials and let the learners make a brief note and submit it through Google Classroom or any other possible social media platforms.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII
- ✓ PPT, handouts, DEMO ++ performance guide, short video clips (Adjustment of differential gear backlash).
- ✓ <https://www.youtube.com/watch?v=d9cxw9d-css> (How to set differential gear backlash).
- ✓ <https://www.youtube.com/watch?v=PrbWIAzoIII> (How to apply side bearing preload).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
3.7.1 Explain symptoms, causes, and remedies of final drive/differential failure. 3.7.2 Troubleshoot final drive and differential.	3.7 Troubleshooting final drive and differential

B. Competencies:

- Determine the problem given by final drive or differential based on the symptom and recommended for repair as per the requirement in any vehicle.

C. Pedagogy/Learning experiences:

- **Contact:**

- ✓ Use handouts, CBLM, pictures (apply bearing preload and to adjust gear backlash), PPT, DEMO++ performance guide, and demonstration.
- ✓ Explain the INFORMATION SHEET 3.7
- ✓ Demonstrate and let the learners perform OPERATION SHEET 3.7 as per the DEMO++ performance guide.
- ✓ Let them solve the SAMPLE SELF CHECK 3.7

- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 3.7.
 - ✓ Let them go through OPERATION SHEET 3.7.
 - ✓ Let them solve the SAMPLE SELF CHECK 3.7
 - ✓ Share PPT and handouts.
 - ✓ Let the learners solve the SAMPLE SELF CHECK 3.7 from CBLM.
 - ✓ Provide the link <https://knowhow.napaonline.com/common-problems-with-differentials-and-what-to-do-about-them/> & <https://www.autoandtransmissionrepairs.com/blog/five-signs-of-failing-differential.php> explains the common problems of differential.

D. Assessment:

- **Contact:**
 - ✓ Conduct class tests, question & answer sessions, and review every session to assess the learners’ understanding.
 - ✓ Use rubrics to assess the assignment and questions given to the learners.
 - ✓ Assess the learners’ ability to perform OPERATION SHEET 3.7 as per practical checklist and rubrics.
- **Non-contact:**
 - ✓ Let the learners write a note and solve the SAMPLE SELF CHECK 3.7 with additional questions given from the learning materials provided to them and assess their answers using rubrics.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for classes XII
- ✓ Handouts
- ✓ <https://knowhow.napaonline.com/common-problems-with-differentials-and-what-to-do-about-them/> & <https://www.autoandtransmissionrepairs.com/blog/five-signs-of-failing-differential.php> (Common problems of differential).

Chapter 4: Servicing final drive and differential Components

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
4.1.1 State function of gear oil. 4.1.2 List properties of gear oil. 4.1.3 Explain classification and specification gear oil. 4.1.4 Change transmission oil. <i>Note:</i> <ul style="list-style-type: none"> ✓ <i>Ensure to dispose of used gear oil at the designated container.</i> ✓ <i>Ensure to use hand gloves.</i> 	4.1 Changing transmission oil

B. Competencies:

- i. Perform periodic maintenance of transmission components and a specified grade of transmission oil is used as per the manufacturer's specification for any vehicle.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Read and explain the INFORMATION SHEET 4.1 with the help of handouts, CBLM, pictures, PPT, and group discussion.
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 4.1 using the DEMO++ performance guide.
 - ✓ Let the learners solve SAMPLE SELF CHECK 4.1
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 4.1.
 - ✓ Let them go through OPERATION SHEET 4.1.
 - ✓ Let the learners solve SAMPLE SELF CHECK 4.1
 - ✓ Upload PPT, pictures, DEMO++ performance guide, short video clips which demonstrate the OPERATION SHEET 4.1.
 - ✓ Provide the link <https://gcoclubewest.ca/changing-transmission-fluid-regularly/#:~:text=Just%20like%20engine%20oil%2C%20transmission,your%20tran%20mission%20is%20lubricated%20properly> that explains the reason for changing transmission oil regularly.
 - ✓ Provide the link <https://www.youtube.com/watch?v=q-nhSpJjYyE> that shows the procedure to change the transmission oil.
 - ✓ Share the link <https://transmastersautocare.com/transmission-fluid-types/> that explains the specification of transmission oil for different vehicles.

D. Assessment:

- **Contact:**
 - ✓ Assess the learners' understanding by conducting the class tests, group presentation and quiz among themselves.
 - ✓ Check the notes and practical reports frequently after winding up the INFORMATION SHEET 4.1 and OPERATION SHEET 4.1.
 - ✓ Assess the learners' ability to perform OPERATION SHEET 4.1 as per the rubrics or practical checklist.
- **Non-contact:**
 - ✓ Give and let the learners solve the questions as well as SAMPLE SELF CHECK 4.1 from CBLM and submit through google classroom.
 - ✓ Let them develop notes after receiving every learning material and submit them through google classroom.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII
- ✓ Handouts and DEMO++ performance guide.

- ✓ <https://gcoclubewest.ca/changing-transmission-fluid-regularly/#:~:text=Just%20like%20engine%20oil%2C%20transmission,your%20transmission%20is%20lubricated%20properly> (The reason for changing transmission oil regularly).
- ✓ <https://www.youtube.com/watch?v=q-nhSpJjYyE> (Procedure to change transmission oil).
- ✓ <https://transmastersautocare.com/transmission-fluid-types/> (Specification of transmission oil for different vehicles).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
4.2.1 Define transmission system. 4.2.2 Explain functions of transmission system. 4.2.3 List types of transmission system. 4.2.4 List types of manual transmission. 4.2.5 Use transmission jack. 4.2.6 Replace transmission <i>Note:</i> ✓ <i>Ensure to use hand gloves.</i>	4.2 Replacing transmission

B. Competencies:

- i. Replace the transmission assembly without damaging other parts and power flow from the engine to the wheel is obtained as per the requirement.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Read and explain INFORMATION SHEET 4.2 using handouts, display pictures (transmission system), videos (the procedure to replace transmission assembly), PPT, and quiz.
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 4.2 as per the DEMO++ performance guide.
 - ✓ Let the learners solve the SAMPLE SELF CHECK 4.2 as classwork.
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 4.2.
 - ✓ Let them go through OPERATION SHEET 4.2.
 - ✓ Let the learners solve the SAMPLE SELF CHECK 4.2 as classwork.
 - ✓ Provide handouts, pictures (transmission system), case study, and DEMO++ performance guide.

D. Assessment:

- **Contact:**
 - ✓ Assess the learners’ ability through the class test, notes, assignments, and responses in the classroom.
 - ✓ Let the learners solve the SAMPLE SELF CHECK 4.2 and other questions as well.
 - ✓ Assess the learners’ ability to determine the faults and perform the OPERATION SHEET 4.2.
- **Non-contact:**
 - ✓ Let the learners solve SAMPLE SELF CHECK 4.2 from CBLM and submit through Google Classroom.
 - ✓ Conduct an online quiz.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII.
- ✓ Handouts, pictures (transmission system), DEMO++ performance guide, and short video clips (the procedure to replace transmission assembly).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
4.3.7 Illustrate construction of manual transmission. 4.3.8 Explain the construction and operation of synchronizing unit. 4.3.9 Explain power flow in transmission. 4.3.10 List types of gear used in manual transmission. 4.3.11 Explain the calculation of gear ratio. 4.3.12 State functions of transmission components. 4.3.13 Explain the gear shifting mechanism. 4.3.14 Use oil seal remover. 4.3.15 Use bearing puller. 4.3.16 Disassemble transmission components <i>Note:</i> ✓ <i>Ensure to use hand gloves.</i>	4.3 Disassembling transmission components

B. Competencies:

- i. Identify the defective components and dismantle as per the standard procedure for any vehicle when required.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Let the learners do group presentations, quiz, brainstorming, and demonstration.
 - ✓ Read the INFORMATION SHEET 4.3 using PPT, handouts, and flipcharts.
 - ✓ Demonstrate SKILL SHEET 4.3(a).
 - ✓ Read, demonstrate SKILL SHEET 4.3(b).

- ✓ Visit nearby TTIS, demonstrate using DEMO ++ performance guide, and let the learners perform OPERATION SHEET 4.3
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 4.3.
 - ✓ Let them go through OPERATION SHEET 4.3
 - ✓ Let them go through SKILL SHEET 4.3(a)
 - ✓ Let them go through SKILL SHEET 4.3 (b)
 - ✓ Let the learners solve SAMPLE SELF CHECK 4.3.
 - ✓ Upload PPT, handouts, short video clips (synchronization of transmission gears) and DEMO ++ performance guide through google classroom.
 - ✓ Share the link <https://www.edmunds.com/car-technology/manual-transmission-basics.html> on working of transmission.
 - ✓ Provide the link <https://www.artofmanliness.com/articles/gearhead-101-understanding-manual-transmission/> & <https://www.youtube.com/watch?v=wCu9W9xNwtI> that elaborate on power flow and gear ratio in transmission.

D. Assessment:

- **Contact:**
 - ✓ Use rubrics to assess the learners' understanding by conducting the class tests, give assignments, questions and let them do the presentations.
 - ✓ Assess the learners' ability to perform OPERATION SHEET 4.3 using a practical checklist or rubrics.
 - ✓ And also assess their practical reports as per the rubrics.\
- **Non-contact:**
 - ✓ Conduct online quizzes, give assignments such as questions, SAMPLE SELF CHECK 4.3, case study, and let the learners submit through Google Classroom or any other social media platforms.
 - ✓ Let them develop notes after receiving every learning material and submit them through Google Classroom.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for classes XII
- ✓ PPT, handouts, short video clips(synchronization of transmission gears), and DEMO ++ performance guide through Google Classroom.
- ✓ <https://www.edmunds.com/car-technology/manual-transmission-basics.html> (Working of transmission).
- ✓ <https://www.artofmanliness.com/articles/gearhead-101-understanding-manual-transmission/> & <https://www.youtube.com/watch?v=wCu9W9xNwtI> (Power flow and gear ratio in transmission).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
4.4.17 Illustrate the defects of transmission components. 4.4.18 Use feeler gauge. 4.4.19 Inspect transmission components <i>Note:</i> ✓ <i>Ensure proper disposal of damaged gear.</i>	4.4 Inspecting transmission components

B. Competencies:

- i. Identify the defects of the transmission components and necessary recommendation is provided for any remedial action as per the requirement in any vehicle.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Read the INFORMATION SHEET 4.4
 - ✓ Demonstrate SKILL SHEET 4.4 by using PPT, providing handouts, and giving group works.
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 4.4 on inspecting transmission components with the help of the DEMO++ performance guide and letting them practice in a group and individually several times.
 - ✓ Take the learners to nearby TTIS (Samthang) and let them perform their practicals in TTI with the help of TTI instructors.
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 4.4.
 - ✓ Let them go through SKILL SHEET 4.4
 - ✓ Let them go through the OPERATION SHEET 4.4.
 - ✓ Provide online content articles, handouts, short video clips, and DEMO++ performance guide.

D. Assessment:

- **Contact:**
 - ✓ Assess the answers to the questions of SAMPLE SELF CHECK 4.4.
 - ✓ Conduct class test, group presentations, quiz, etc
 - ✓ Assess the learner's ability to perform OPERATION SHEET 4.4 based on practical checklist or rubrics.
- **Non-contact:**
 - ✓ Let the learners solve the SAMPLE SELF CHECK 4.4 and submit it through Google Classroom.
 - ✓ Conduct online quizzes, give assignments such as questions, case study and let the learners submit through Google Classroom or any possible social media platforms.
 - ✓ Let them develop notes after receiving every learning material and submit it through Google Classroom.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII
- ✓ Handouts and DEMO++ performance guide.

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
4.5.1 Explain the purpose of backlash/thrust play. 4.5.2 Adjust gear backlash/thrust play.	4.5 Adjusting gear backlash/thrust play

B. Competencies:

- i. Assemble the transmission gearbox and adjust gear backlash/thrust play as per the standard procedure for any vehicle.

C. Pedagogy/Learning experiences:

• **Contact:**

- ✓ Explain the INFORMATION SHEET 4.5.
- ✓ Demonstrate and let the learners perform OPERATION SHEET 4.5
- ✓ Let them solve SAMPLE SELF CHECK 4.5
- ✓ Use PPT, handouts, DEMO ++ performance guide, group discussion, and short video clips (to adjust gear backlash/thrust play).

• **Non-contact:**

- ✓ Read the INFORMATION SHEET 4.5.
- ✓ Go through the OPERATION SHEET 4.5
- ✓ Let them solve SAMPLE SELF CHECK 4.5
- ✓ Provide PPT slides, handouts, and short video clips (to adjust gear backlash/thrust play).

D. Assessment:

• **Contact:**

- ✓ Let the learners solve the SAMPLE SELF CHECK 4.5 to assess their understanding.
- ✓ Assess their ability to perform OPERATION SHEET 4.5 and the report written in their practical book.as per the rubrics developed.
- ✓ Conduct class tests and give questions or let them write a short note as homework after every session.
- ✓ Check the learner note that has been jot down while teaching frequently.

• **Non-contact:**

- ✓ Let them solve and submit answers of SAMPLE SELF CHECK 4.5 through Google Classroom or any other social media platforms.
- ✓ Let the learners write and submit a succinct note through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos, going through the handouts, and CBLM.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII

- ✓ PPT, handouts, DEMO ++ performance guide, pictures, and short video clips.

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
4.6.1 Assemble manual transmission. <i>Note:</i> ✓ <i>Ensure to use hand gloves</i>	4.6 Assembling manual transmission

B. Competencies:

- i. Eliminate the faults and assemble the transmission assembly of any vehicle with specific thrust play as per the manufacturer manual.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Read and explain the INFORMATION SHEET 4.6
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 4.6 as per the DEMO++ performance guide.
 - ✓ Let the learners solve the SAMPLE SELF CHECK 4.6.
 - ✓ Let the learners do the presentation, group discussion, and brainstorming.
 - ✓ Use PPT, handouts, DEMO++ performance guide, and short video clips (assemble transmission assembly).
- **Non-contact:**
 - ✓ Read the INFORMATION SHEET 4.6.
 - ✓ Go through the OPERATION SHEET 4.6.
 - ✓ Let the learners solve the SAMPLE SELF CHECK 4.6.
 - ✓ Give handouts, short video clips, case studies, and the DEMO++ performance guide.

D. Assessment:

- **Contact:**
 - ✓ Let the learners answer the SAMPLE SELF CHECK 4.6.
 - ✓ Assess the learners' ability to perform OPERATION SHEET 4.6 as per the practical checklist or rubrics.
 - ✓ Conduct the class test, presentation, group work, and assess using rubrics developed.
 - ✓ Asses the notes and assignments maintained by the learners as per the rubrics developed.
- **Non-contact:**
 - ✓ Let the learners solve the SAMPLE SELF CHECK 4.6 and submit through the Google Classroom or any possible social media platforms,
 - ✓ Conduct online quizzes, give assignments such as questions, case study and let the learners submit through Google Classroom.
 - ✓ Let them develop notes after receiving every learning material and submit it through Google Classroom.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII
- ✓ Handouts, short video clips (assemble transmission assembly), and DEMO++ performance guide.

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
4.7.1 State the purpose of the transfer case. 4.7.2 Illustrate the construction of the transfer case. 4.7.3 List types of the transfer case. 4.7.4 Explain the operation of the full-time and part-time transfer case. 4.7.5 Overhaul transfer case	4.7 Overhauling transfer case

B. Competencies:

- i. Overhaul and examine the defective transfer case components of any vehicle as per the standard procedures.

C. Pedagogy/Learning experiences:

• **Contact:**

- ✓ Read and explain the INFORMATION SHEET 4.7
- ✓ Demonstrate and let the learners perform OPERATION SHEET 4.7
- ✓ Let the learners solve SAMPLE SELF CHECK 4.7
- ✓ Use PPT CBLM.

• **Non-contact:**

- ✓ Let the learners read the INFORMATION SHEET 4.7
- ✓ Let them go through the OPERATION SHEET 4.7
- ✓ Let the learners solve SAMPLE SELF CHECK 4.7
- ✓ Provide handouts, pictures (construction of transfer case), and short video clips (operation of transfer case).
- ✓ Provide the link [https://www.ques10.com/p/11617/what-is-transfer-box-explain-its-construction-and-/](https://www.ques10.com/p/11617/what-is-transfer-box-explain-its-construction-and/) that explains the construction of transfer case.
- ✓ Share the link <https://www.aautomotive.co.nz/mechanical-servicing/diff-transfer-servicing/> difference between transfer case and differential.
- ✓ Share the link <https://www.youtube.com/watch?v=1c81r25VfGU> that shows the working of the transfer case.

D. Assessment:

• **Contact:**

- ✓ Assess the learners' ability to perform OPERATION SHEET 4.7 according to the inspection checklist using rubrics or practical checklist.
- ✓ Conduct class tests and viva.

- ✓ Assess the learner’s conceptual understanding, let them answer the SAMPLE SELF CHECK 4, and given additional questions using rubrics to provide necessary intervention.
- **Non-contact:**
 - ✓ Assess the learner’s comprehension by letting them answer the SAMPLE SELF CHECK 4.7 and submit through Google Classroom or any other social media platforms.
 - ✓ Conduct an online quiz.
 - ✓ Assess their notes and practical reports after the session.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII
- ✓ PPT, short video clips (operation of transfer case), and pictures (construction of transfer case).
- ✓ <https://www.ques10.com/p/11617/what-is-transfer-box-explain-its-construction-and-/> (Construction of transfer case).
- ✓ <https://www.aautomotive.co.nz/mechanical-servicing/diff-transfer-servicing/> (Difference between the transfer case and differential).
- ✓ <https://www.youtube.com/watch?v=1c81r25VfGU> (Working of transfer case).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
4.8.1 Define transaxle. 4.8.2 List types of the transaxle. 4.8.3 Replace transaxle <i>Note:</i> i. <i>Ensure to use hand gloves.</i>	4.8 Replacing transaxle

B. Competencies:

- i. Determine the defects of the transaxle and is replaced as per the standard procedure for any vehicle.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Let the learners discuss in a group and explain the INFORMATION SHEET 4.8 Demonstrate and let the learners perform OPERATION SHEET 4.8 as per the DEMO++ performance guide.
 - ✓ Let the learners solve SAMPLE SELF CHECK 4.8
 - ✓ Group presentation, pictures (parts of transaxle), and PPT.
- **Non-contact:**
 - ✓ Let them read the INFORMATION SHEET 4.8.
 - ✓ Let them go through OPERATION SHEET 4.8.
 - ✓ Let the learners solve SAMPLE SELF CHECK 4.8

- ✓ Provide DEMO++ performance guide, pictures (parts of transaxle), and handouts.
- ✓ Share the link <https://www.cjponyparts.com/resources/transaxle-transmission-differences> that explains the difference between transmission and transaxle gearbox.

D. Assessment:

- **Contact:**
 - ✓ Assess the learners’ report on particular practical OPERATION SHEET 4.8 as per the rubrics.
 - ✓ Conduct the class test and viva to assess their understanding.
 - ✓ Assess the learners’ ability to determine the faults of the transaxle and replace it in any vehicle.
- **Non-contact:**
 - ✓ Let the learners go through and make a note/report on learning materials / OPERATION SHEET 4.2 and send through Google Classroom.
 - ✓ Assess the question & answers & the case study submitted through Google Classroom, WeChat, etc.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII
- ✓ Handouts, DEMO++ performance guide, and pictures (parts of transaxle).
- ✓ <https://www.cjponyparts.com/resources/transaxle-transmission-differences> (Difference between transmission and transaxle gearbox).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
4.9.1 Explain the construction of transaxle. 4.9.2 Explain the power flow of the transaxle. 4.9.3 Disassemble transaxle components. <i>Note:</i> ✓ <i>Ensure proper disposal of old transaxle fluid at the designated container.</i>	4.9 Disassembling transaxle components

B. Competencies:

- i. Identify the defective parts of the transaxle through visual inspection and the components are dismantled sequentially as per the requirement in any vehicle.

C. Pedagogy/Learning experiences:

- **Contact:**
 - ✓ Read and explain the INFORMATION SHEET 4.9 using PPT, CBLM, handouts.
 - ✓ Let the learners perform OPERATION SHEET 4.9 as per the DEMO++ performance guide after the demonstration.
 - ✓ Let them solve the SAMPLE SELF CHECK 4.9.
- **Non-contact:**
 - ✓ Let the learners read INFORMATION SHEET 4.9 and make notes.

- ✓ Let them go through OPERATION SHEET 4.9.
- ✓ Give few additional questions with SAMPLE SELF CHECK 4.9.
- ✓ Provide handouts and conduct class tests and quiz.
- ✓ Share the link <https://www.youtube.com/watch?v=aQb5Bg6zlG4> that shows the construction of transaxle.
- ✓ Share the link <http://www.crankshift.com/transaxle/> explains the components and failures of the transaxle.

D. Assessment:

- **Contact:**

- ✓ Assess the learners' ability to identify perform OPERATION SHEET 4.9 as per the practical checklist or rubrics.
- ✓ Let the learners solve and upload the SAMPLE SELF CHECK 4.3 with few additional questions assigned to them.
- ✓ Assess their notes were taken during class hours as well as the home works, class works, etc often.
- ✓ Conduct class tests, quizzes, and question & answer sessions.

- **Non-contact:**

- ✓ Let the learners solve and upload the SAMPLE SELF CHECK 4.3 with few additional questions assigned to them through Google Classroom.
- ✓ Give a case study and submit the answer through any possible social media platforms.

E. Resources (online and offline):

- ✓ Competency-Based Learning Materials for class XII
- ✓ Handouts, case studies, and PPT.
- ✓ <https://www.youtube.com/watch?v=aQb5Bg6zlG4> (Construction of transaxle).
- ✓ <http://www.crankshift.com/transaxle/> (Components and failures of transaxle).

A. Learning Objectives/Strand/Broad theme/Chapter/ topics:

Learning objectives	Core concepts (Chapters/Topics)
4.10.1 State functions of transaxle components. 4.10.2 State function of sealant. 4.10.3 Explain the application of sealant. 4.10.4 Assemble transaxle components. <i>Note:</i> ✓ <i>Ensure to use hand gloves.</i> ✓ <i>Ensure proper disposal of old sealant.</i>	4.10 Assembling transaxle components

B. Competencies:

- i. Assemble the transaxle components sequentially as per the standard procedure in any vehicle.

C. Pedagogy/Learning experiences

- **Contact:**
 - ✓ Read and explain the INFORMATION SHEET 4.10
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 4.10
 - ✓ Let the learners solve the SAMPLE SELF CHECK 4.10 and keep their notes and practical reports up to date.
 - ✓ Use PPT, handouts, and DEMO++ performance guide.
- **Non-Contact**
 - ✓ Let the learners read the INFORMATION SHEET 4.10.
 - ✓ Let them go through the OPERATION SHEET 4.10.
 - ✓ Let the learners solve the SAMPLE SELF CHECK 4.10
 - ✓ Provide handouts and short video clips (components of transaxle).
 - ✓ Provide the link <https://weddleindustries.com/products/transaxle-components> that explains the components of the transaxle.

D. Assessment

- **Contact:**
 - ✓ Assess the learners' ability to perform OPERATION SHEET 4.10.
 - ✓ Let the learners answer the SAMPLE SELF CHECK 4.10. Based on the assessment, provide necessary intervention.
 - ✓ Assess the learners' ability to explain the functions of transaxle components.
 - ✓ Assess their notes, practical reports, and conduct class test.
- **Non-Contact:**
 - ✓ Use rubrics to assess the learners' solved question/ answer and SAMPLE SELF CHECK 4.10 submitted through Google Classroom or any other possible social media platforms.
 - ✓ Assess the learners' notes written after gathering all the learning materials provided to them.
 - ✓ Conduct online quizzes through Google Classroom.

E. Resources (Online and offline)

- ✓ Competency-Based Learning Materials for Class XII
- ✓ Handout
- ✓ <https://weddleindustries.com/products/transaxle-components> (Components of transaxle).

A. Learning objectives/Broad theme/Strand/chapter/topics:

Learning Objectives	Core Concepts(Chapters/topic)
4.11.1 Explain symptoms, causes, and remedies of transmission failure. 4.11.2 Troubleshoot transmission failure	4.11 Troubleshooting transmission failure

B. Competencies:

- i. Determine the problems with the manual transmission in any vehicle as per the job requirement.

C. Pedagogy/Learning Experiences

• Contact:

- ✓ Let the learners discuss INFORMATION SHEET 4.11 in a group/pair and do the presentation.
- ✓ Let them read and perform OPERATION SHEET 4.11 and let them practice individually.
- ✓ Let them solve the SAMPLE SELF CHECK 4.11
- ✓ Use PPT, flipchart, or board.

• Non-contact:

- ✓ Let the learners read INFORMATION SHEET 4.11
- ✓ Let them go through OPERATION SHEET 4.11
- ✓ Let them solve the SAMPLE SELF CHECK 4.11
- ✓ Provide handouts to learners through Google Classroom or any other social media platforms.
- ✓ Share the link https://www.testingautos.com/car_care/when-replace-coil-springs.html that explains the common problems of the transmission assembly.

D. Assessment

• Contact:

- ✓ Assess the learners' ability to explain the INFORMATION SHEET 4.11 through the presentation.
- ✓ Assess the learners' ability to perform OPERATION SHEET 4.11 as per the practical checklist or rubrics.
- ✓ Assess the learner's conceptual understanding by letting the learners to answer the SAMPLE SELF CHECK 4.11 and case study.
- ✓ Conduct class tests and viva.

• Non-Contact:

- ✓ Assess the learner's conceptual understanding by letting the learners answer the SAMPLE SELF CHECK 4.11 and let learners submit through Google Classroom or any other social media platforms.
- ✓ Let the learners write the succinct notes and submit it through Google Classroom

E. Resources (Online and Offline)

- ✓ Competency-Based Learning Materials for Class XII

- ✓ Handout
- ✓ https://www.testingautos.com/car_care/when-replace-coil-springs.html (Common problems of transmission assembly).

Chapter 5: Overhauling and Service Clutch Mechanism

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
5.1.1 Define clutch system. 5.1.2 State function of the clutch system. 5.1.3 Explain the classification of the clutch system. 5.1.4 Illustrate construction clutch system. 5.1.5 Explain operation clutch system. 5.1.6 Replace clutch assembly <i>Note:</i> <ul style="list-style-type: none"> ✓ <i>Ensure to use hand gloves.</i> ✓ <i>Ensure to dispose of the used clutch plate at a designated place.</i> 	5.1 Replacing clutch assembly

B. Competencies

- i. Identify the defective clutch and replace the clutch assembly in the correct sequence as per the requirement in any vehicle.

C. Pedagogy/learning experience

- **Contact:**
 - ✓ Read and explain the INFORMATION SHEET 5.1
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 5.1
 - ✓ Let them solve the SAMPLE SELF CHECK 5.1
 - ✓ Use PPT, handouts, and posters (clutch assembly).
- **Non-contact**
 - ✓ Make the learners read INFORMATION SHEET 5.1
 - ✓ Make the learners go through OPERATION SHEET 5.1
 - ✓ Let them solve the SAMPLE SELF CHECK 5.1
 - ✓ Share the link https://www.youtube.com/watch?v=HY_PjmHRxuE, <https://www.youtube.com/watch?v=devo3kdSPQY> & <https://www.youtube.com/watch?v=6DL0j0eKD8Y> that explain the operation of the clutch system.
 - ✓ Share the web link <https://www.theengineerspost.com/what-is-clutch/> which explains the clutch system- definition, types, function, and working principle.

D. Assessment

- **Contact**

- ✓ Assess the learners explain and answer any questions ask based on INFORMATION SHEET 5.1.
- ✓ Make learners solve the SAMPLE SELF CHECK 5.1 with some additional questions and asses as per the rubrics.
- ✓ Assess the learners' ability to perform OPERATION SHEET 5.1 using a performance guide as per the rubrics or practical checklist.
- ✓ Assess the learners' notes and practical reports after the session as per the rubrics.

- **Non-contact**

- ✓ Ask learners to solve the SAMPLE SELF CHECK 5.1 from CBLM and send answers through Google Classroom or any other social media platforms.
- ✓ Give additional questions from CBLM and other resources-Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms.

E. Resources(online and offline)

- ✓ Competency-Based Learning Material for Class XII
- ✓ PPT, handouts, and posters (clutch assembly).
- ✓ https://www.youtube.com/watch?v=HY_PjmHRxuE, <https://www.youtube.com/watch?v=devo3kdSPQY> & <https://www.youtube.com/watch?v=6DL0j0eKD8Y> (Operation/ working principle of the clutch system).
- ✓ <https://www.theengineerspost.com/what-is-clutch/> (Clutch system- definition, types, function, and working principle).

A. Learning objectives/Broad theme/Strand/Chapter/topics:

Learning objectives	Core concepts(Chapters/Topic)
5.2.1 Explain functions of the clutch plate, pressure plate, release bearing, pilot bearing, flywheel, and release fork. 5.2.2 Illustrate parts of the pressure plate. 5.2.3 List types of the pressure plate. 5.2.4 Explain the construction and function of clutch plate components. 5.2.5 List types of the clutch plate. 5.2.6 Use a straight edge gauge. 5.2.7 Inspect clutch components. <i>Note:</i> ✓ <i>Ensure to use hand gloves.</i>	5.2 Inspecting clutch components

B. Competencies :

- i. Identify the symptoms and inspect the clutch components as per the standard procedure for any vehicle.

C. Pedagogy/Learning experiences

• **Contact:**

- ✓ Read and explain the INFORMATION SHEET 5.2 using PPT, handout, poster (clutch assembly), and board.
- ✓ Read and demonstrate the SKILL SHEET 5.2
- ✓ Demonstrate and let the learners perform OPERATION SHEET 5.2 using the DEMO++performance guide.
- ✓ Let the learners solve the SAMPLE SELF CHECK 5.2

• **Non-contact:**

- ✓ Let the learners read the INFORMATION SHEET 5.2
- ✓ Let them read the SKILL SHEET 5.2
- ✓ Let them go through OPERATION SHEET 5.2
- ✓ Let them solve SAMPLE SELF CHECK 5.2
- ✓ Provide the handouts, PPT slides, DEMO++performance guide, and posters (clutch assembly).
- ✓ Provide the link <https://autocar-inspection.blogspot.com/2020/07/clutch-components-and-function.html> to learn about clutch components and their function.

D. Assessment

• **Contact:**

- ✓ Assess the learner's ability to explain, present or answer the questions based on INFORMATION SHEET 5.2.
- ✓ Assess the learners' ability to perform OPERATION SHEET 5.2 as per the rubrics or practical checklist.
- ✓ Assess the learners' notes, practical reports, and solved SAMPLE SELF CHECK 5.2.
- ✓ Conduct class tests and quiz.

• **Non- Contact**

- ✓ Assess the learner's work (notes, solved SAMPLE SELF CHECK 5.2 and other additional questions) as per the rubrics. Provide necessary intervention based on the assessment.
- ✓ Conduct an online quiz.

E. Resources (Online or offline)

- ✓ Competency-Based Learning Materials for Class XII
- ✓ PPT, handout, poster (clutch assembly), and DEMO++ performance guide.
- ✓ <https://autocar-inspection.blogspot.com/2020/07/clutch-components-and-function.html> (Clutch components and their function).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topics)
5.3.8 Explain the interval of changing clutch fluid. 5.3.9 Change clutch fluid. <i>Note:</i> ✓ Ensure proper disposal of used clutch fluid. ✓ Ensure to use hand gloves.	5.3 Changing clutch fluid

B. Competencies

- i. Refill the specific grade of clutch fluid as per the manufacturer's specification for any vehicle.

C. Pedagogy/Learning experience

- **Contact:**

- ✓ Let the learners discuss in pair and present the INFORMATION SHEET 5.3
- ✓ Read and let the learners perform OPERATION SHEET 5.3 as per the DEMO++performance guide.
- ✓ Let the learners solve the SAMPLE SELF CHECK 5.3
- ✓ Use PPT and handouts.

- **Non-contact**

- ✓ Let the learners read the INFORMATION SHEET 5.3
- ✓ Let them go through the OPERATION SHEET 5.3
- ✓ Let the learners solve SAMPLE SELF CHECK 5.3
- ✓ Based on the information obtained from the learning resources, the learner develops notes.
- ✓ Share this link <https://www.youtube.com/watch?v=21lajVcqq7c/> / <https://www.youtube.com/watch?v=DvOa0gPjN6Q> to learn about how to change the clutch fluid.

D. Assessment

- **Contact**

- ✓ Assess the learners to perform OPERATION SHEET 5.3 as per the rubrics or practical checklist.
- ✓ Asses the solved answers of SAMPLE SELF CHECK 5.3 as per the rubrics.
- ✓ Give additional questions from CBLM and other resources-Google/YouTube.
- ✓ Assess the learner's notes and practical reports after the session. Provide necessary intervention based on the assessment.
- ✓ Conduct class test, viva, and question/answer session.

- **Non-contact**

- ✓ Assess the learner's conceptual comprehension by assessing the answers of SAMPLE SELF CHECK 5.3 uploaded in the Google Classroom. Provide necessary intervention following the assessment.

- ✓ Provide additional questions from CBLM and other resources-Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms.
- ✓ Conduct an online quiz.

E. Resources(online and offline)

- ✓ Competency-Based Learning Material for Class XII
- ✓ PPT and handouts and DEMO++performance guide.
- ✓ <https://www.youtube.com/watch?v=21lajVcqq7c> / <https://www.youtube.com/watch?v=DvOa0gPJN6Q>(Procedure to change clutch fluid).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
5.4.10 List components of the clutch master cylinder. 5.4.11 State function clutch master cylinder. 5.4.12 Explain the working principle of the clutch master cylinder. 5.4.13 State function of the slave cylinder. 5.4.14 List components of the slave cylinder. 5.4.15 Explain the working principle of the slave cylinder. 5.4.16 Replace clutch master cylinder kits <i>Note:</i> ✓ <i>Ensure to use hand gloves and goggles.</i> ✓ <i>Ensure to dispose used clutch fluid and kits in safe place.</i>	5.4 Replacing clutch master cylinder kits

B. Competencies:

- i. Install the clutch master cylinder kits in the correct order as per the requirement.

C. Pedagogy/learning experience

• **Contact:**

- ✓ Let the learners work in group and do the presentation on INFORMATION SHEET 5.4
- ✓ Read, explain and let the learners perform OPERATION SHEET 5.4 as per the DEMO++ performance guide.
- ✓ Let them solve SAMPLE SELF CHECK 5.4
- ✓ Use PPT, handouts, picture (master cylinder kit).

• **Non-contact**

- ✓ Let the learners read the INFORMATION SHEET 5.4

- ✓ Let them go through OPERATION SHEET 5.4
- ✓ Let them solve SAMPLE SELF CHECK 5.4
- ✓ Let the learners go through all the learning materials, explore the information, and develops notes.

D. Assessment

- **Contact**

- ✓ Assess the learner’s understanding by letting them do the presentation, conduct class tests, viva, and question/answer sessions.
- ✓ Let them solve the SAMPLE SELF CHECK 5.4.
- ✓ Assess learner’s ability to perform the OPERATION SHEET 5.4 as per the rubrics or practical checklist.
- ✓ Assess the learner’s notes and practical reports often.

- **Non-contact**

- ✓ Assess the learner's conceptual understanding by assessing the answers to questions of SAMPLE SELF CHECK 5.4 uploaded in the Google Classroom. Provide necessary intervention following the assessment.
- ✓ Provide additional questions from CBLM and other resources-Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms
- ✓ Conduct an online quiz.

E. Resources(online and online)

- ✓ Competency-Based Learning Material for Class XII
- ✓ PPT, handouts, picture (master cylinder kit), and DEMO++ performance guide.

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
5.5.17 State function of the clutch cable. 5.5.18 Explain the operation of the clutch cable. 5.5.19 Replace clutch cable. <i>Note:</i> <ul style="list-style-type: none"> ✓ <i>Ensure to dispose of old clutch cable to the designated place.</i> ✓ <i>Ensure to use hand gloves.</i> 	5.5 Replacing clutch cable

B. Competencies

- i. Replace the clutch cable as per the standard procedures for any vehicle.

C. Pedagogy/learning experience

- **Contact:**

- ✓ Read and explain the INFORMATION SHEET 5.5 using PPT and handouts.
- ✓ Demonstrate and let the learners perform the OPERATION SHEET 5.5

- ✓ Let the learners solve the SAMPLE SELF CHECK 5.5
- **Non-contact**
 - ✓ Let the learners read the INFORMATION SHEET 5.5
 - ✓ Let them go through OPERATION SHEET 5.5
 - ✓ Let them solve SAMPLE SELF CHECK 5.5
 - ✓ Provide handouts and short video clips (the procedure to replace clutch cable).

D. Assessment

- **Contact**
 - ✓ Assess their ability to perform OPERATION SHEET 5.5 as per the rubrics or practical checklist.
 - ✓ Assess the learners' understanding by checking their notes, practical reports, conduct class tests, and viva.
- **Non-contact**
 - ✓ Assess the learner's conceptual understanding by assessing the answers of SAMPLE SELF CHECK 5.5 uploaded in the Google Classroom. Provide necessary intervention following the assessment.
 - ✓ Assess the learner's notes submitted through Google Classroom or any other social media platforms.
 - ✓ Conduct an online quiz.

E. Resources(online and online)

- ✓ Competency-Based Learning Material for Class XII
- ✓ Handouts and short video clips (a procedure to replace clutch cable).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
5.6.20 Explain the purpose of adjusting clutch pedal height.	5.6 Adjusting clutch pedal free play
5.6.21 Explain the specification of clutch pedal free play.	
5.6.22 <i>Adjust clutch pedal free play.</i>	

B. Competencies:

- i. Adjust the clutch pedal play as per the manufacturer's specification for any vehicle.

C. Pedagogy/learning experience

- **Contact:**
 - ✓ Read and explain the INFORMATION SHEET 5.6
 - ✓ Read and let the learners perform OPERATION SHEET 5.6
 - ✓ Let the learners solve the SAMPLE SELF CHECK 5.6
 - ✓ Use PPT, board, handouts, and short video clips (the procedure to adjust clutch pedal free play).

- **Non-contact**

- ✓ Let the learners read the INFORMATION SHEET 5.6
- ✓ Let them go through OPERATION SHEET 5.6
- ✓ Let the learners explore the information and develop notes, answer the SAMPLE SELF CHECK 5.6.
- ✓ Upload the handouts and short video clips (the procedure to adjust clutch pedal free play).
- ✓ Provide the link <https://www.youtube.com/watch?v=I4CUBB01qX8> to learn how to adjust clutch cable.
- ✓ Share the link <https://www.autoblog.com/2016/01/05/symptoms-of-a-bad-or-failing-clutch-cable/#:~:text=A%20clutch%20cable%20is%20the,transmission%20can%20be%20safely%20shifted> to learn about the symptoms of the bad clutch cable.
- ✓ Share the link <http://www.carttechautoparts.com/clutch-cable/> that explains clutch and clutch cable.

D. Assessment

- **Contact**

- ✓ Assess the learners' ability to explain INFORMATION SHEET 5.6 as per the rubrics.
- ✓ Assess the learners' ability to perform OPERATION SHEET 5.6 as per the rubrics or practical checklist.
- ✓ Assess the learners' notes written in class while explaining. Provide necessary intervention if needed.
- ✓ Conduct class tests, viva, and practical exams.

- **Non-contact**

- ✓ Assess the learner's conceptual understanding by assessing the answers of SAMPLE SELF CHECK 5.6 with some additional questions uploaded in the Google Classroom. Provide necessary intervention following the assessment.
- ✓ Assess learners' notes written after receiving all the learning materials as per the rubrics.
- ✓ Conduct an online quiz.

E. Resources(online and online)

- ✓ Competency-Based Learning Material for Class XII
- ✓ Handouts, short video clips (the procedure to adjust clutch pedal free play).and PPT.
- ✓ <https://www.youtube.com/watch?v=I4CUBB01qX8> (How to adjust clutch cable).
- ✓ <https://www.autoblog.com/2016/01/05/symptoms-of-a-bad-or-failing-clutch-cable/#:~:text=A%20clutch%20cable%20is%20the,transmission%20can%20be%20safely%20shifted> (Symptoms of bad clutch cable).
- ✓ <http://www.carttechautoparts.com/clutch-cable/>(Explanation on clutch and clutch cable).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
4.1.1 Explain symptoms, causes, and remedies of clutch failure. 4.1.2 Troubleshoot clutch system failure.	5.7 Troubleshooting clutch system failure

B. Competencies

- i. Diagnose the faults in the clutch system as per the standard procedures for any vehicle.

C. Pedagogy/learning experience

- **Contact:**
 - ✓ Let the learners discuss in a group and present the INFORMATION SHEET 5.7
 - ✓ Demonstrate and let the learners perform OPERATION SHEET 5.7
 - ✓ Let the learners solve the SAMPLE SELF CHECK 5.7
 - ✓ Provide handouts to the learners.
- **Non-contact**
 - ✓ Let the learners read the INFORMATION SHEET 5.7
 - ✓ Let them go through OPERATION SHEET 5.7
 - ✓ Let the learners solve the SAMPLE SELF CHECK 5.7
 - ✓ Provide handouts.
 - ✓ Provide the link <https://itstillruns.com/diagnose-clutch-problems-4855239.html> to learn the steps to diagnose the clutch problems.

D. Assessment

- **Contact**
 - ✓ Assess the learners' conceptual understanding of symptoms, causes, and remedies of clutch system failure as per the rubrics.
 - ✓ Assess the learners' ability to perform OPERATION SHEET 5.7 as per the rubrics or practical checklist.
 - ✓ Assess the learners' response to SAMPLE SELF CHECK 5.7.
- **Non-contact**
 - ✓ Assess the learners' conceptual understanding of symptoms, causes, and remedies of clutch system failure as per the rubrics conducting an online quiz.
 - ✓ Assess the learner's response to SAMPLE SELF CHECK 5.7 uploaded in the Google Classroom.

E. Resources(online and online)

- ✓ Competency-based learning materials for class XII.
- ✓ Handouts.
- ✓ <https://itstillruns.com/diagnose-clutch-problems-4855239.html> (Steps to diagnose the clutch problems).

MODULE VI: PERFORMING BASIC AUTO ELECTRICAL WORKS

Chapter 1: Replacing Basic Electrical Components

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
1.1.1 Define soldering. 1.1.2 List types of soldering lead and its size. 1.1.3 State the purpose of soldering iron. 1.1.4 Explain the purpose of flux during soldering. 1.1.5 Use soldering iron. 1.1.6 Perform soldering <i>Note:</i> ✓ <i>Ensure to use hand gloves, goggles, and an apron.</i>	1.1 Performing soldering

B. Competencies

- i. Perform the soldering for the connections and electronic components in any vehicle as per the requirement

C. Pedagogy/learning experience

- **Contact:** An instructor may carry out the instructional practice on lettering and numbering through the following order.
 - ✓ Read and explain the INFORMATION SHEET 1.1 using PPT and handouts.
 - ✓ Read and demonstrate SKILL SHEET 1.1
 - ✓ Demonstrate and let them perform OPERATION SHEET 1.1
 - ✓ Let them solve the SAMPLE SELF CHECK 1.1
- **Non-contact**
 - ✓ Let the learners read the INFORMATION SHEET 1.1
 - ✓ Let them go through OPERATION SHEET 1.1
 - ✓ Let them solve SAMPLE SELF CHECK 1.1
 - ✓ Provide handouts to learners through google classroom or any other possible social media platforms.
 - ✓ Provide the link https://www.youtube.com/watch?v=6EiIDNEiB_U that shows how to perform soldering for the connection of wire and electronic components.

D. Assessment

- **Contact**
 - ✓ Assess the learner's understanding by checking their notes and practical reports as per the rubrics.

- ✓ Assess the learners’ ability to perform OPERATION SHEET 1.1 as per the rubrics or practical checklist.
- ✓ Let the learners solve the SAMPLE SELF CHECK 1.1.
- ✓ Conduct class tests, question/answer sessions, and viva.
- **Non-contact**
 - ✓ Let them solve the SAMPLE SELF CHECK 1.1 with few additional questions to assess their conceptual understanding submitted through Google Classroom or any social media platforms.
 - ✓ Assess the learners’ ability to take a note from the given learning materials using a rubric.
 - ✓ Conduct an online quiz.

E. Resources(online and online)

- ✓ Competency-Based Learning Material for Class XII
- ✓ Handouts
- ✓ https://www.youtube.com/watch?v=6EiIDNEiB_U (How to perform soldering).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
1.2.1 Explain basic electricity. 1.2.2 List types of crimp terminal and connectors. 1.2.3 List types of wire jointing. 1.2.4 Illustrate colour coding and wire size. 1.2.5 Repair wires and connectors <i>Note:</i> <ul style="list-style-type: none"> ✓ <i>Ensure to use hand gloves.</i> ✓ <i>Ensure to dispose wasted wires in proper place.</i> 	1.2 Repairing wires and connectors.

B. Competencies

- i. Use the appropriate size and length of wires to avoid short circuits and open circuits daily.

C. Pedagogy/learning experience

- **Contact:**
 - ✓ Read and explain the INFORMATION SHEET 1.2
 - ✓ Demonstrate and let the learners’ perform the OPERATION SHEET 1.2
 - ✓ Let the learners solve the SAMPLE SELF CHECK 1.2
 - ✓ Provide handouts and short video clips (types of wire joints).
- **Non-contact:**
 - ✓ Let the learners read the INFORMATION SHEET 1.2

- ✓ Let them go through OPERATION SHEET 1.2
- ✓ Let them solve SAMPLE SELF CHECK 1.2
- ✓ Provide short video clips (types of wire joints), handouts, PPT, and case studies.
- ✓ Provide the link <https://www.youtube.com/watch?v=wBjT7KZqVuM> that explains Ohm's law.

D. Assessment:

- **Contact:**

- ✓ Assess the learner's ability to perform OPERATION SHEET 1.2 as per the rubric.
- ✓ Assess the practical report was written in their practical book as per the rubrics.
- ✓ Let the learners solve the SAMPLE SELF CHECK 1.2 and note to assess their comprehension.
- ✓ Check the learner note that has been jot down while teaching frequently.
- ✓ Conduct class tests and viva.

- **Non-contact:**

- ✓ Let them solve SAMPLE SELF CHECK 1.2 and submit it through Google Classroom.
- ✓ Let them write the notes and submit them through Google Classroom.
- ✓ Conduct online quiz and virtual viva through any possible social media platforms
- ✓ Provide the link

E. Resources(online and offline)

- ✓ Competency-Based Learning Materials for class XII
- ✓ Handouts, short video clip (types of wire joints), PPT, and case study.
- ✓ <https://www.youtube.com/watch?v=wBjT7KZqVuM> (Ohm's law).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
6 State function of the fuse.	1.3 Changing fuse
7 List types of the fuse.	
8 Illustrate fuse rating and color-coding.	
9 Change fuse.	

B. Competencies

- i. Use any type of fuse as per the task provided.

C. Pedagogy/learning experience

- **Contact:**

- ✓ Read and explain the INFORMATION SHEET 1.3
- ✓ Demonstrate and let the learners perform OPERATION SHEET 1.3
- ✓ Let them solve SAMPLE SELF CHECK 1.3
- ✓ Use handouts, pictures (automobile fuses).

- **Non-contact**
 - ✓ Let the learner' read the INFORMATION SHEET 1.3
 - ✓ Let them go through OPERATION SHEET 1.3
 - ✓ Let them solve SAMPLE SELF CHECK 1.3
 - ✓ Provide the handouts through google classroom.
 - ✓ Share the link <https://components101.com/articles/different-types-of-fuses-and-their-applications> that explains the different types of fuses and their application.

D. Assessment

- **Contact**
 - ✓ Assess learner's ability to perform OPERATION SHEET 1.3 as per the rubrics or practical checklist.
 - ✓ Let them solve the SAMPLE SELF CHECK 1.3.
 - ✓ Assess their understanding by conducting class tests and viva.
- **Non-contact**
 - ✓ Let them solve the SAMPLE SELF CHECK 1.3 and assess their answers submitted through google classroom.
 - ✓ Provide additional questions from CBLM and other resources-Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms
 - ✓ Let them solve the questions on the case study and submit them through google classroom

E. Resources(online and online)

- ✓ Competency-Based Learning Material for Class XII
- ✓ Handouts, case studies, and pictures (Automobile fuses).
- ✓ <https://components101.com/articles/different-types-of-fuses-and-their-applications> (Different types of fuses and their application).

Chapter 2: Servicing batteries and jump-start vehicle

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
2.1.1 Define battery and explain its function. 2.1.2 Explain the purpose of disconnecting the negative battery terminal. 2.1.3 Change battery. <i>Note:</i> <ul style="list-style-type: none"> ✓ <i>Ensure to disconnect the battery negative terminal before changing the battery.</i> ✓ <i>Ensure to use hand gloves and an apron.</i> 	2.1 Changing battery

B. Competencies:

- ✓ Determine the defects of the battery and is replaced with correct polarity for any vehicle.

C. Pedagogy/learning experience

• Contact:

- ✓ Read and explain the INFORMATION SHEET 2.1
- ✓ Read, demonstrate and let the learners perform OPERATION SHEET 2.1
- ✓ Let the learners solve the SAMPLE SELF CHECK 2.1
- ✓ Provide handouts, PPT, and short video clips (the procedure to change battery).

• Non-contact

- ✓ Let the learners read the INFORMATION SHEET 2.1
- ✓ Let them go through JOB SHEET 2.1
- ✓ Let them go through OPERATION SHEET 2.1
- ✓ Let them solve SAMPLE SELF CHECK 2.1
- ✓ Provide short video clips (the procedure to change battery), DEMO++ performance guide, and handouts.
- ✓ Share the link <https://www.youtube.com/watch?v=OQGLZxPcd-o> or <https://www.youtube.com/watch?v=R5Xa6eMAriQ> to learn how to change a car battery.

D. Assessment

• Contact

- ✓ Assess the learners' understanding of the lesson through the notes, class test, and question/ answer session as per the rubrics.
- ✓ Assess the learners' ability to perform OPERATION SHEET 2.1 using observation checklist and rubrics as per the standard procedures.
- ✓ Asses the report written in their practical notebook after performing OPERATION SHEET 2.1

• Non-contact

- ✓ Assess the learner's conceptual understanding by assessing the answers of SAMPLE SELF CHECK 2.1 uploaded in the Google Classroom. Provide necessary intervention following the assessment.
- ✓ Provide additional questions from CBLM and other resources-Google/YouTube and let learners submit answers through Google Classroom.
- ✓ Conduct an online quiz.

E. Resources(online and online)

- ✓ Competency-Based Learning Material for Class XII
- ✓ Handouts and short video clips (The procedure to change battery).
- ✓ <https://www.youtube.com/watch?v=OQGLZxPcd-o> or <https://www.youtube.com/watch?v=R5Xa6eMAriQ> (How to change car battery).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
2.2.1 Explain the construction of the battery. 2.2.1 Perform visual inspection <i>Note:</i> <ul style="list-style-type: none">○ Ensure to use hand gloves.	2.2 Performing a visual inspection

B. Competencies:

- i. Improve the life span and safeguard the automotive batteries.

C. Pedagogy/learning experience

• Contact:

- ✓ Read and explain the INFORMATION SHEET 2.2
- ✓ Demonstrate and let the learners perform OPERATION SHEET 2.2
- ✓ Let them solve SAMPLE SELF CHECK 3.1
- ✓ Use handouts, CBLM, DEMO++ performance guide, PPT, pictures (construction of battery)

• Non-contact

- ✓ Let the learners read the INFORMATION SHEET 2.2
- ✓ Let them go through OPERATION SHEET 2.2
- ✓ Let them solve SAMPLE SELF CHECK 2.2
- ✓ Provide handouts through google classroom or any other social media platforms.
- ✓ Provide the web link <https://batteryworld.varta-automotive.com/en-gb/how-does-car-battery-work> to learn how does a car battery work and how is it constructed?

D. Assessment

• Contact

- ✓ Assess the learners' ability to perform the OPERATION SHEET 2.2 as per the rubrics or practical checklist.
- ✓ Give additional question on SAMPLE SELF CHECK 2.2 and assess their answers
- ✓ Conduct class tests and question/ answer sessions.
- ✓ Develop rubrics and assess the learners' practical reports and notes.

• Non-contact

- ✓ Let the learners' solve the SAMPLE SELF CHECK 2.2 with some additional questions and asses as per the rubrics.
- ✓ Assess the learners' notes taken from the learning materials provided to them and submit them through any possible social media platforms.
- ✓ Conduct an online quiz.

E. Resources(online and online)

- ✓ Competency-Based Learning Material for Class XII
- ✓ Handouts and pictures (Construction of battery).

- ✓ <https://batteryworld.varta-automotive.com/en-gb/how-does-car-battery-work> (How does a car battery work and how is it constructed?).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
2.3.1 Describe the specification of the battery. 2.3.2 Use multimeter. 2.3.2 Check battery terminal Note: ✓ <i>Ensure proper handling of multimeter/voltmeter.</i>	2.3 Checking battery voltage

B. Competencies

- Meaure the battery voltage as per the standard procedure for any vehicle.

C. Pedagogy/learning experience

- **Contact:**
 - ✓ Read and explain the INFORMATION SHEET 2.3
 - ✓ Demonstrate and let them perform the SKILL SHEET 2.3
 - ✓ Demonstrate and let them perform the OPERATION SHEET 2.3
 - ✓ Use PPT, handouts, and pictures (Circuit diagram for checking battery voltage).
- **Non-contact**
 - ✓ Let the learners read the INFORMATION SHEET 2.3
 - ✓ Let them go through SKILL SHEET 2.3
 - ✓ Let them go through OPERATION SHEET 2.3
 - ✓ Let them solve SAMPLE SELF CHECK 2.3
 - ✓ Provide PPT, handouts, pictures (Circuit diagram for checking battery voltage), and short video clips (check battery voltage).
 - ✓ Provide the link <https://www.youtube.com/watch?v=Eqw1CF1nOt8> to learn how to test a car battery with a multimeter (Voltage + Cold Cranking Amps).

D. Assessment

- **Contact**
 - ✓ Let them solve the SAMPLE SELF CHECK 2.3 and assess their answers accordingly.
 - ✓ Assess the learners' ability to read and perform the OPERATION SHEET 2.3
 - ✓ Conduct class tests and develop rubrics to rate every learner's notes and practical reports.
- **Non-contact**
 - ✓ Let them solve and the submit answers of SAMPLE SELF CHECK 2.3 through Google Classroom or any other social media platforms.

- ✓ Let the learners write and submit a succinct note through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos, going through the handouts, and CBLM.
- ✓ Conduct an online quiz.

E. Resources(online and online)

- ✓ Competency-Based Learning Material for Class XII
- ✓ Handouts and pictures (Circuit diagram for checking battery voltage) and short video clips (check battery voltage).
- ✓ <https://www.youtube.com/watch?v=Eqw1CF1nOt8> [How to test a car battery with a multimeter(Voltage + Cold Cranking Amps)].

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
2.4.1 State the purpose of jump-starting of battery. 2.4.2 Construct circuit of a jump start. 2.4.3 Use battery starter. 2.4.4 Perform jump-starting <i>Note:</i> <ul style="list-style-type: none"> ✓ <i>Ensure proper handling of battery starter.</i> ✓ <i>Ensure to use hand gloves.</i> 	2.4 Performing jump-starting

B. Competencies

- i. Perform jump-starting to provide supplementary power to the dead battery for any vehicle as per the standard procedure

C. Pedagogy/learning experience

• **Contact:**

- ✓ Let the learners' read the INFORMATION SHEET 2.4
- ✓ Let the learners read and perform SKILL SHEET 2.4
- ✓ Demonstrate and let the learners perform OPERATION SHEET 2.4
- ✓ Use PPT, handouts, and posters (Circuit of jump start).

• **Non-contact**

- ✓ Let the learners' the INFORMATION SHEET 2.4
- ✓ Let the learners read the SKILL SHEET 2.4
- ✓ Let the learners go through the OPERATION SHEET 2.4
- ✓ Provide handouts.
- ✓ Provide the link <https://www.youtube.com/watch?v=i11o2hNy2hE> to learn the steps of jump-starting.

D. Assessment

• **Contact**

- ✓ Assess the learners' notes and practical reports as per the rubrics.
- ✓ **Assess** the learners' ability to perform SKILL SHEET 2.4 as per the rubrics or practical checklist.

- ✓ Let the learners solve the SAMPLE SELF CHECK 2.4
- ✓ Conduct class tests and viva.
- **Non-contact**
 - ✓ Assess their notes or the task assigned to them based on the links, videos, handouts, etc provided through possible social media platforms.
 - ✓ Let them do the SAMPLE SELF CHECK 2.4 and submit through Google Classroom or any other social media platforms.

E. Resources(online and online)

- ✓ Competency-Based Learning Material for Class XII
- ✓ Handouts and posters (Circuit of jump start).
- ✓ <https://www.youtube.com/watch?v=i11o2hNy2hE> (Perform jump starting).

A. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts(Chapters/Topic)
2.5.1 State the function of the battery terminal. 2.5.2 List the types of the battery terminal. 2.5.3 State the purpose of applying petroleum jelly 2.5.4 Change battery terminal <i>Note:</i> ✓ <i>Ensure proper handling of battery end remover.</i>	2.5 Changing battery terminal

B. Competencies

- i. Change battery terminal to the adequate flow of current from the battery to electrical components of automotive vehicle as per the manufacture’s specification.

C. Pedagogy/learning experience

- **Contact:**
 - ✓ Let the learners read the INFORMATION SHEET 2.5
 - ✓ Let them read and perform OPERATION SHEET 2.5
 - ✓ Let them read and perform JOB SHEET 2.5
 - ✓ Let them solve the SAMPLE SELF CHECK 2.5.
 - ✓ Use PPT, handouts, short video clips (the procedure to change battery terminal).
- **Non-contact**
 - ✓ Let the learners read the INFORMATION SHEET 2.5
 - ✓ Let them read the OPERATION SHEET 2.5
 - ✓ Let them solve the JOB SHEET 2.5.
 - ✓ Let them solve the SAMPLE SELF CHECK 2.5.
 - ✓ Provide the handouts, PPT slides, and short video clips (the procedure to change battery terminal).

- ✓ Provide the link https://www.youtube.com/watch?v=zYNL_BUU-Ec that shows the steps to change the battery terminal.

D. Assessment

- **Contact:**

- ✓ Assess the learners' answers on SAMPLE SELF CHECK 2.5
- ✓ Develop rubrics and assess the learners' practical reports and notes.
- ✓ Assess the learners' ability to perform the OPERATION SHEET 2.5 as per the rubrics or practical checklist.
- ✓ Conduct class tests and viva.

- **Non-contact**

- ✓ Assess the learner's conceptual understanding by assessing the answers of SAMPLE SELF CHECK 2.5 uploaded in the Google Classroom.
- ✓ Provide additional questions from CBLM and other resources-Google/YouTube and let learners submit answers through Google Classroom or any other social media platforms.
- ✓ Let the learners solve the questions on the case study and assess the answers submitted through Google Classroom.

E. Resources(online and online)

- ✓ Competency-Based Learning Material for Class XII
- ✓ Handouts, short video clips (The procedure to change battery terminal), and PPT.
- ✓ https://www.youtube.com/watch?v=zYNL_BUU-Ec (Changing of the battery terminal).

RESOURCES

1. Technical and Vocational Education and Training (TVET) New Normal Curriculum Framework (classes: PP-XII).
2. Competency-Based Learning Materials (Automobile).