

National School Curriculum

INSTRUCTIONAL GUIDE FOR TVET (AUTOMOBILE)

CLASSES XI & XII



Department of Curriculum and Professional Development
Ministry of Education, Royal Government of Bhutan



“Your parents, relatives, and friends would be very proud of what you have achieved. At your age, to have completed your studies is your personal accomplishment. Your knowledge and capabilities are a great asset for the nation. I congratulate you for your achievements. Finally, your capabilities and predisposition towards hard work will invariably shape the future of Bhutan. You must work with integrity, you must keep learning, keep working hard, and you must have the audacity to dream big.”

- His Majesty Jigme Khesar Namgyel Wangchuck

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Foreword

COVID-19 has suddenly caused unforgiving disruptions in 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 teaching and learning in traditional settings.

In the new normal education, human interaction and well-being are a priority. Digital technology that enables communication, collaboration and learning across distance, is 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 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 National School 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 then 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.
Tashi Delek.



Tashi Namgyal,
Director

Introduction

Technical and Vocational Education and Training (TVET) is aimed at providing knowledge and skills for employment. It comprise education, training and skills development related to a wide range of occupational fields, production, services and livelihood. The Department of Curriculum and Professional Development, Ministry of Education envisages 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) 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, 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 the then 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 National School Curriculum Instructional Guide is prepared not only to encourage blended learning but also to facilitate remote learning. The guide would help the schools to implement the curriculum effectively without limiting to contact teaching/learning besides using a variety of pedagogies.

Purpose of the Instructional Guide

Among the many definitions of ‘curriculum’ this Instructional Guide underscores the meaning of curriculum as a standard and competency-based sequence of planned learning experiences where learners practise and achieve the proficiency in applying the learning experiences in real life scenarios. These proficiencies, in the curriculum framework, have been stated as “competencies” and ‘objectives’ for each class. In keeping with the principle, ‘less is more’ as stated the National School Curriculum, the contents of the curriculum have been reworked, so that learners can be engaged more in activities that can lead to the acquisition of required skills rather than having them ‘cover the syllabus’.

This Instructional Guide believes that the classroom teachers, as professional individuals, can make the most authentic and reliable judgment about each learner’s learning needs and the learning experiences to be provided to propel the learners in the learning continuum. With these beliefs and principles as the background, the following are the purposes of this document.

- Facilitate learners acquire required skills and competencies.
- Strengthen blended learning, including flipped classroom with multimedia, digital pedagogies and ICT devices and websites as tools to share the responsibility of learning amongst the learners, teachers, the parents and other stakeholders.
- Facilitate the use of Continuous Formative Assessment for learning using diverse appropriate assessment techniques and tools commensurate with individual differences in learning, and gather evidence to guide planning of educational programmes and activities for learners.
- Promote inclusive learning through the blended learning which facilitates learning anywhere, any time with the learner being responsible for the learning.
- Provide suggestive means of acquiring required skills by building interrelationship among, and through, the integration of the four strands of the curriculum.
- Help teachers assume the roles of facilitator, guide, motivator and evaluator.
- Guide teachers, parents and other stakeholders in helping learners achieve their potential.
- Empower teachers to design their own ‘course of study’ or ‘class curriculum’ for their students in line with the National School Curriculum Framework.
- Enhance sharing the burden of responsibility and accountability for learning amongst the stakeholders, including the learners themselves.

In this age of advanced communication and information technology, contents are widely available from a number of sources. Therefore, the teachers can select, structure and sequence the contents as required to best suit the learners’ need while maintaining coherence and consistency. In other words, while the contents of the curriculum are negotiable, the competencies and objectives are not. While, teachers may have access to number of materials, it should be kept in mind that the teaching and learning should be focused on achieving the competencies rather than ‘covering of the syllabus’. The teaching learning materials should be used as means to create a learning environment that is competency-based where the learners need to master the skills presented to them. While designing lesson plans and teaching learning activities, teachers need to ensure that the materials are relevant and appropriate for the given task.

The assessment should be competency-based wherein the teachers should assess the learners' mastery of the skills stated as competencies and objectives for each class. Teachers should use appropriate assessment tools and techniques depending on the nature of the learning activities. The learners should be clearly informed about the success criteria, the areas of assessment and the tools to be used so that they know exactly what tasks are to be performed or expected of them. In the process of the performance, the teacher should continuously provide feedback and, if necessary, modify instructions. Efforts have to be made to ensure that every learner has mastered the skills

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Class XI

MODULE III: SERVICING STEERING SYSTEM

Chapter 1: Servicing steering components

A. Competency/Competencies:

- i. Replace the rack and pinion power steering gearbox as per the standard procedures for any vehicle.
- ii. Use the recommended power steering fluid as per the manufacturer's specification for all the vehicles.

B. Learning objectives/Topic:

Learning objectives	Topic
1.10.1 State function of the power steering system. 1.10.2 Illustrate construction of hydraulic rack and pinion power steering system. 1.10.3 Explain the operation of the hydraulic rack and pinion power steering system. 1.10.4 Illustrate the construction of an electronic power steering system. 1.10.5 Explain the operation of the electronic power steering system. 1.10.6 Replace rack & pinion power steering gearbox Notes: <i>Ensure steering fluid is disposed of in a designated container.</i>	1.10. Replacing rack & pinion power steering gearbox Overview: The topic covers information on function, construction of hydraulic rack and pinion power steering, its operation and the way to replace rack & pinion power steering gearbox.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 1.10
- ✓ Demonstrate on OPERATION SHEET 1.10
- ✓ Provide guided practice on OPERATION SHEET 1.10
- ✓ Let learner read and perform individual practices on OPERATION SHEET 1.10
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on the operation of the hydraulic rack and pinion.
- ✓ Let learner read the INFORMATION SHEET 1.10
- ✓ Let learner read OPERATION SHEET 1.10
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=2LGoRJ4ZR10> to learn about power rack and pinion steering system.

- ✓ Provide link <https://www.youtube.com/watch?v=i6J9kvdSg7E/>
<https://www.youtube.com/watch?v=em1O8mz7sF0> to learn about how power steering system works.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 1.10
- ✓ Let learner read and perform OPERATION SHEET 1.10 and assess according to checklist/rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 1.10 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and asses as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 1.10 through Google Classroom.
- ✓ Let learner read the OPERATION SHEET 1.10 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 1.10 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit a succinct note through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=2LGoRJ4ZR10> (Power rack and pinion steering system).
- ✓ <https://www.youtube.com/watch?v=i6J9kvdSg7E/>
- ✓ <https://www.youtube.com/watch?v=em1O8mz7sF0> (How power steering system works).

A. Competency/Competencies:

- i. Power steering drive belts are inspected for defects as per the standard procedures.
- ii. The belt tension is adjusted to specification as per the service manual for any vehicle.

A. Learning objectives/Topic:

Learning objectives	Topic
1.11.7 State the function of the power steering drive belt. 1.11.8 State the types of power steering drive belts. 1.11.9 List the belt defects. 1.11.10 Use belt tension gauge. 1.11.11 Replace power steering belt Notes: Ensure proper handling of the belt tension gauge.	1.11 Replacing power steering belt Overview: This topic covers mainly the information on function of the power steering drive belt, types of belts, defect of belts and how to replace the worn-out power steering belt.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 1.11
- ✓ Let learner read and perform individual practices on OPERATION SHEET 1.11
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on the function of the power steering drive belt.
- ✓ Let learner read the INFORMATION SHEET 1.11
- ✓ Let learner read the OPERATION SHEET 1.11
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=N38Effl0DUg> to learn about power steering replacement & V-Belt adjustments
- ✓ Provide web link <https://www.axi-international.com/the-effects-of-diesel-fuelcontamination/> to learn about the effects of diesel fuel contamination.
- ✓ Give additional questions from other resources such as Google, YouTube, etc.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 1.11
- ✓ Let learner read and perform OPERATION SHEET 1.11 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 1.11 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write a short note as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 1.11 through Google classroom.
- ✓ Let learner read the OPERATION SHEET 1.11 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 1.11 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit a succinct note through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=N38Effl0DUg> (power steering replacement & VBelt adjustments)
- ✓ <https://www.axi-international.com/the-effects-of-diesel-fuel-contamination/> (effects of diesel fuel contamination).

A. Competency/Competencies:

- i. Refill the specific grade of power steering fluid as per the manufacturer’s specification for any vehicle
- ii. Change the power steering fluid as per standard procedures for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
1.12.1 State the types of power steering fluid. 1.12.2 List the properties of the power steering fluid. 1.12.3 State the function of the power steering fluid. 1.12.4 Change power steering fluid Notes: <i>Ensure old steering fluid is disposed of in the designated container.</i>	1.12 Changing the power steering fluid Overview: The learner can change the power steering fluid besides knowing the types, properties and function of the power steering fluid.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 1.12
- ✓ Let learner read and perform individual practices on OPERATION SHEET 1.12
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on the function of power steering fluid.
- ✓ Let learner read the INFORMATION SHEET 1.12
- ✓ Let learner read the OPERATION SHEET 1.12
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link https://www.youtube.com/watch?v=5YHr2pp_7hA to learn about how power steering works and why you may be losing fluid.
- ✓ Provide link <https://blog.nationwide.com/power-steering-fluid/> to learn about the power steering fluid.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 1.12
- ✓ Let learner read and perform OPERATION SHEET 1.12 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 1.12 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write a short note as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 1.12 through Google classroom.

- ✓ Let learner read the OPERATION SHEET 1.12 and assess according to their understanding through zoom question & answer session.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 1.12 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit a succinct note through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ https://www.youtube.com/watch?v=5YHr2pp_7hA (How power steering works and why you may be losing fluid).
- ✓ <https://blog.nationwide.com/power-steering-fluid/> (power steering fluid).

A. Competency/Competencies:

- i. Carryout the purging of the hydraulic power steering system as per the job that requires following standard procedures.

B. Learning objectives/Topic:

Learning objectives	Topic
1.13.1 State purpose of purging/bleeding hydraulic power steering. 1.13.2 Purging hydraulic power steering Notes: <ul style="list-style-type: none"> ✓ <i>Ensure the fluid is not spilled.</i> 	1.13 Purging hydraulic power steering Overview: The topic covers information on purpose of purging/bleeding hydraulic power steering and how to do carry out purging/bleeding of hydraulic power steering.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 1.13
- ✓ Let learner read and perform individual practices on OPERATION SHEET 1.13
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on how to do bleeding hydraulic power steering.
- ✓ Let learner read the INFORMATION SHEET 1.13
- ✓ Let learner read the OPERATION SHEET 1.13
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=AtM9aQCS4-I> to learn about how to bleed power steering system the RIGHT WAY!.

- ✓ Provide link <https://www.youtube.com/watch?v=nfHoqSbFwGk> to learn about how to bleed your power steering fluid
- ✓ Give additional based on CBLM.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 1.13
- ✓ Let learner read and perform OPERATION SHEET 1.13 and assess according to checklist/rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 1.13 and assess their understanding through zoom.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and asses as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write a short note as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 1.13 through Google classroom.
- ✓ Let learner read the OPERATION SHEET 1.13 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 1.13 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit a succinct note through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=AtM9aQCS4-I> (How to bleed power steering system the RIGHT WAY! Bleed Power steering).
- ✓ <https://www.youtube.com/watch?v=nfHoqSbFwGk> (How to bleed your power steering fluid).

A. Competency/Competencies:

- i. Adjust the power steering drive belt tension and replace the power steering pump in the correct sequence as per the manufacturer's specification for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
1.14.1 State the function of the power steering pump. 1.14.2 Illustrate the construction of the power steering pump. 1.14.3 Explain the types of steering pumps. 1.14.4 Explain the working operation of the power steering pump. 1.14.5 Replace power steering pump Notes: <i>Ensure old steering fluid is disposed of in a designated container.</i>	1.14 Replacing power steering pump Overview: Besides knowing about the function, construction, types and operation of power steering pump, students know how to replace worn out power steering pump.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 1.14
- ✓ Let learner read and perform individual practices on OPERATION SHEET 1.14
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on the working operation of the power steering pump.
- ✓ Let learner read the INFORMATION SHEET 1.14
- ✓ Let learner read the OPERATION SHEET 1.14
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=4zVPkhz6k8> to learn about how to replace the power steering pump in your car.
- ✓ Provide link <https://www.youtube.com/watch?v=AExeeo00QOQ> to learn about how power steering pumps work.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 1.14
- ✓ Let learner read and perform OPERATION SHEET 1.14 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 1.14 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write a short note as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 1.14 through Google classroom.

- ✓ Let learner read the OPERATION SHEET 1.14 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 1.14 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=4zVPkhnz6k8> (How to replace power steering pump in your car).
- ✓ <https://www.youtube.com/watch?v=AExeeo00QQQ> (How power steering pumps work).

A. Competency/Competencies:

- i. Diagnose the faults or problems in the steering system as per the standard procedures for any vehicle.

B. Learning objectives/Topic:

Learning Objectives	Topic
1.15.1 Explain the symptoms, causes, and remedies of steering system failure. 1.15.2 Troubleshooting steering system	1.15 Troubleshooting steering system Overview: The topic covers the information on the symptoms, causes, and remedies of steering system failure and how to troubleshoot steering system failures.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 1.15
- ✓ Let learner read and perform JOB SHEET 1.15
- ✓ Demonstrate on OPERATION SHEET 1.15
- ✓ Provide guided practice on OPERATION SHEET 1.15
- ✓ Let learner read and perform individual practices on OPERATION SHEET 1.15
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on how to diagnose faults for the steering system.
- ✓ Let learner read the INFORMATION SHEET 1.15
- ✓ Let learner read the OPERATION SHEET 1.15
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.

- ✓ Provide link <https://www.tpub.com/basae/222.htm> to learn about troubleshooting steering system
- ✓ Provide link <https://www.youtube.com/watch?v=3CNX83OHKfA> to learn about how to troubleshoot a power steering system.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 1.15
- ✓ Let learner read and perform OPERATION SHEET 1.15 and assess according to checklist/rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 1.15 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write a short note as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 1.15 through Google classroom.
- ✓ Let learner read the OPERATION SHEET 1.15 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 1.15 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.tpub.com/basae/222.htm> (Troubleshooting steering system)
- ✓ <https://www.youtube.com/watch?v=3CNX83OHKfA> (How to troubleshoot a power steering system).

Chapter 2: Servicing kingpin

A. Competency/Competencies:

- i. Remove the wheel bearing and kingpin bearings using SST for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
<p>2.1.1 Define kingpin.</p> <p>2.1.2 State the function of the kingpin.</p> <p>2.1.3 Explain the construction of the kingpin.</p> <p>2.1.4 Remove kingpin assembly</p> <p>Notes:</p> <ul style="list-style-type: none">✓ <i>Ensure proper handling of hand tools.</i>✓ <i>Ensure the vehicle is safely supported with a safety stand.</i>✓ <i>Ensure that the old grease is disposed of at the designated container.</i>	<p>2.1 Removing kingpin assembly</p> <p>Overview: Learner can know about the function and construction of the kingpin besides being able to remove kingpin assembly.</p>

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 2.1
- ✓ Demonstrate on OPERATION SHEET 2.1
- ✓ Provide guided practice on OPERATION SHEET 2.1
- ✓ Let learner read and perform individual practices on OPERATION SHEET 2.1
- ✓ Use PPT, handouts, and poster.
- ✓ Provide short video on the construction of kingpin
- ✓ Let learner read the INFORMATION SHEET 2.1
- ✓ Let learner read the OPERATION SHEET 2.1
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=9HbkAcP7b5k> to learn about how to remove kingpin.
- ✓ Provide link [https://en.wikipedia.org/wiki/Kingpin_\(automotive_part\)](https://en.wikipedia.org/wiki/Kingpin_(automotive_part)) to learn about the function of the kingpin.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 2.1
Let learner read and perform OPERATION SHEET 2.1 and assess according to checklist/
rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 2.1 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and asses as per the rubrics developed.
- ✓ Assess the learner's notes, assignments, etc. frequently.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 2.1 through Google
classroom.
- ✓ Let learner read the OPERATION SHEET 2.1 and assess according to their understanding.
- ✓ Let learner solve and submit answers to SAMPLE SELF CHECK 2.1 through Google Classroom
or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible
social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social
media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=9HbkAcP7b5k> (How to remove kingpin).
- ✓ [https://en.wikipedia.org/wiki/Kingpin_\(automotive_part\)](https://en.wikipedia.org/wiki/Kingpin_(automotive_part)) (function of kingpin)

A. Competency/Competencies:

- i. Adjust the kingpin bearing preload as per the given specification for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
2.2.1 State the function of kingpin components. 2.2.2 Explain kingpin inclination. 2.2.3 Explain the causes and remedies of kingpin failure. 2.2.4 Refit kingpin assembly Notes: ✓ <i>Ensure proper handling of pre-load gauge.</i>	2.2 Refitting kingpin assembly Overview: The topic covers information on function of kingpin components, kingpin inclination, causes and remedies of kingpin failure besides knowing how to refit kingpin assembly.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 2.2
- ✓ Let learner read and perform individual practices on OPERATION SHEET 2.2
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on kingpin inclination.
- ✓ Let learner read the INFORMATION SHEET 2.2
- ✓ Let learner read the OPERATION SHEET 2.2
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link https://www.youtube.com/watch?v=mh_BUOguZQk to learn how king inclination angle (KPI/KPA) works pin.
- ✓ Provide link <https://www.youtube.com/watch?v=KkvKLXHydqQ> to learn about how to replace kingpin.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 2.2
- ✓ Let learner read and perform OPERATION SHEET 2.2 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 2.2 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learner's notes, assignments, etc. frequently.
- ✓ Give questions or let learner write short notes as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 2.2 through Google classroom.
- ✓ Let learner read the OPERATION SHEET 2.2 and assess according to their understanding.
- ✓ Let learner solve and submit answers to SAMPLE SELF CHECK 2.2 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=KkvKLXHydqQ> (How to replace kingpin).
- ✓ https://www.youtube.com/watch?v=mh_BUOguZQk (How king pin inclination angle works).

A. Competency/Competencies:

- i. Perform the kingpin greasing as per the standard practices for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
2.3.1 Define grease. 2.3.2 State the purpose of greasing. 2.3.3 Explain the types of grease. 2.3.4 State the properties of grease. 2.3.5 Perform kingpin greasing Notes: <i>Ensure old/grease container is disposed of at the designated place.</i>	2.3 Performing kingpin greasing Overview: This topic covers the information on purpose, types and properties of grease besides knowing how to perform kingpin greasing.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 2.3
- ✓ Demonstrate on OPERATION SHEET 2.3
- ✓ Provide guided practice on OPERATION SHEET 2.3
- ✓ Let learner read and perform individual practices on OPERATION SHEET 2.3
- ✓ Use PPT, handouts, poster and Provide a short video.
- ✓ Let learner read the INFORMATION SHEET 2.3
- ✓ Let learner read the OPERATION SHEET 2.3
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=o-e4m4CDqvs> to learn about how to grease kingpins.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 2.3
- ✓ Let learner read and perform OPERATION SHEET 2.3 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 2.3 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learner's notes, assignments, etc. frequently.
- ✓ Give questions or let learner write a short note as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 2.3 through Google classroom.
- ✓ Let learner read the OPERATION SHEET 2.3 and assess according to their understanding.

- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 2.3 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=o-e4m4CDqvs> (How to grease kingpins)

A. Competency/Competencies:

- i. Mount and tight the knuckle assembly is to specific torque for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
2.4.1 List the components of knuckle assembly 2.4.2 State the function of knuckle assembly 2.4.3 Explain the function of the knuckle oil seal 2.4.4 Replace knuckle assembly Notes: <i>Ensure proper handling of hand tools</i>	2.4 Replacing knuckle assembly Overview: The topic covers information on components, function of knuckle assembly and knuckle oil seal besides knowing how to replace knuckle assembly.

C. C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 2.4
- ✓ Let learner read and perform JOB SHEET 2.4
- ✓ Demonstrate on OPERATION SHEET 2.4
- ✓ Provide guided practice on OPERATION SHEET 2.4
- ✓ Let learner read and perform individual practices on OPERATION SHEET 2.4
- ✓ Use PPT, handouts, and poster.
- ✓ Let learner read the INFORMATION SHEET 2.4
- ✓ Let learner read the OPERATION SHEET 2.4
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=Ub8bmoEdBUE> to learn about how to replace a knuckle assembly.
- ✓ Provide link <https://www.youtube.com/watch?v=3CNX83OHKfA> to learn about how to troubleshoot a Power Steering System.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 2.4
- ✓ Let learner read and perform OPERATION SHEET 2.4 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 2.4 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write a short note as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 2.4 through Google classroom.
- ✓ Let learner read the OPERATION SHEET 2.4 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 2.4 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=Ub8bmoEdBUE> (How to replace a knuckle assembly).
- ✓ <https://www.youtube.com/watch?v=3CNX83OHKfA> (How to troubleshoot a power steering system)

Chapter 3: Performing wheel alignment

A. Competency/Competencies:

- i. Identify the defects in suspension and steering components for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
3.1.1 Define wheel alignment. 3.1.2 Define steering geometry. 3.1.3 State the factors affecting wheel alignment. 3.1.4 List the specification of tire pressure. 3.1.5 State importance of pre-alignment. 3.1.6 Use a Tire pressure gauge. 3.1.7 Perform pre-alignment Notes: <i>Ensure compressed air is used for the right application.</i>	3.1 Performing pre-alignment Overview: The topic covers information on steering geometry, factor affecting wheel alignment and importance of pre-alignment besides being able to perform pre-alignment.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 3.1
- ✓ Let learner read and perform SKILL SHEET 3.1
- ✓ Demonstrate on OPERATION SHEET 3.1
- ✓ Provide guided practice on OPERATION SHEET 3.1
- ✓ Let learner read and perform individual practices on OPERATION SHEET 3.1
- ✓ Use PPT, handouts, and poster.
- ✓ Let learner read the INFORMATION SHEET 3.1
- ✓ Let learner read SKILL SHEET 3.1
- ✓ Let learner read the OPERATION SHEET 3.1
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=aO-ZonYaNGc> to learn about pre alignment check
- ✓ Provide link <https://www.sundevilauto.com/top-3-ways-your-car-can-get-bad-caralignment/> to learn about the factors affecting wheel alignment
- ✓ Provide link <https://www.lesschwab.com/article/do-i-really-need-an-alignment.html> to learn about the importance of alignment.
- ✓ Provide link <https://www.youtube.com/watch?v=VbReLNi2JP4> to learn steering geometry.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.1
- ✓ Let learner read and perform OPERATION SHEET 3.1 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 3.1 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write a short note as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.1 through Google classroom.
- ✓ Let learner read the OPERATION SHEET 3.1 and assess according to their understanding.
- ✓ Let learner solve and submit answers to SAMPLE SELF CHECK 3.1 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=aO-ZonYaNGc> (Pre -alignment check)
- ✓ <https://www.sundevilauto.com/top-3-ways-your-car-can-get-bad-car-alignment/> (Factors affecting wheel alignment)
- ✓ <https://www.lesschwab.com/article/do-i-really-need-an-alignment.html> (Importance of alignment).
- ✓ <https://www.youtube.com/watch?v=VbReLNi2JP4> (Videos on steering geometry)

A. Competency/Competencies:

- i. Measure the toe from the correct location and Toe is set as per the manufacturer's specification for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
<p>3.2.1 Define toe angle. 3.2.2 State the purpose of maintaining toe angle. 3.2.3 Explain the turning radius of toe angle. 3.2.4 State the methods of adjusting toe-angle. 3.2.5 Adjust toe-angle</p> <p>Notes:</p> <ul style="list-style-type: none">✓ <i>Ensure the vehicle brake securely.</i>✓ <i>Vehicle is wedged and engages the handling of SST (Steering wheel lock).</i>	<p>3.2 Adjusting toe-angle</p> <p>Overview: This topic covers information on how to adjust toe- angle and its importance.</p>

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 3.2
- ✓ Let learner read and perform individual practices on OPERATION SHEET 3.2
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video clip on adjusting toe-angle.
- ✓ Let learner read the INFORMATION SHEET 3.2
- ✓ Let learner read the OPERATION SHEET 3.2
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=z0xCQkh1Njs> to learn about Toe-in and Toe-out, wheel alignment - how it works.
- ✓ Provide link <https://www.howacarworks.com/steering/adjusting-toe-alignment-on-wheels> to learn about adjusting toe alignment on wheels.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.2
- ✓ Let learner read and perform OPERATION SHEET 3.2 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 3.2 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and asses as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write short notes as homework after every session.

- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.2 through Google classroom.
- ✓ Let learner read the OPERATION SHEET 3.2 and assess according to their understanding.
- ✓ Let learner solve and submit answers to SAMPLE SELF CHECK 3.2 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=z0xCQkh1Njs>(Toe-in and Toe-out, wheel alignment - how it works).
- ✓ <https://www.howacarworks.com/steering/adjusting-toe-alignment-on-wheels> (Adjusting toe alignment on wheels)

A. Competency/Competencies:

- i. Adjust the camber angle by comparing the offset bolt graduation with manufacturer specifications for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
3.3.1 Define camber. 3.3.2 State the purpose of the camber. 3.3.3 Determine the effects of camber failure. 3.3.4 Explain steering axis inclination. 3.3.5 Adjust camber Notes: <i>Ensure vehicle is parked on level ground.</i>	3.3 Adjusting camber Overview: Besides knowing about the purpose, effect of camber failure, and steering axis inclination, the learner can adjust camber angle as per the requirement.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 3.3
- ✓ Let learner read and perform SKILL SHEET 3.3
- ✓ Demonstrate on OPERATION SHEET 3.3
- ✓ Provide guided practice on OPERATION SHEET 3.3
- ✓ Let learner read and perform individual practices on OPERATION SHEET 3.3

- ✓ Use PPT, handouts, and poster.
- ✓ Let learner read the INFORMATION SHEET 3.3
- ✓ Let learner read the OPERATION SHEET 3.3
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=XoNUnkgravl> to learn about how to adjust camber on a car using camber bolts.
- ✓ Provide link https://www.youtube.com/watch?v=IZLiP_37Oso to learn about steering axis inclination.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.3
- ✓ Let learner read and perform OPERATION SHEET 3.3 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 3.3 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write short notes as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.3 through Google classroom.
- ✓ Let learner read the OPERATION SHEET 3.3 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 3.3 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platforms.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=XoNUnkgravl> (How to adjust camber on a car using camber bolts).
- ✓ Provide link https://www.youtube.com/watch?v=IZLiP_37Oso (steering axis inclination)

A. Competency/Competencies:

- i. Set the caster angle as per the standard procedures for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
3.4.1 Define caster. 3.4.2 State the purpose of the caster. 3.4.3 Explain the effects of caster failure. 3.4.4 Adjust caster angle Notes: <i>Ensure vehicle is parked on level ground.</i>	3.4 Adjust caster angle Overview: Besides knowing the purpose and effects of caster failure, the learner can acquire the technique of adjusting caster angle.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 3.4
- ✓ Demonstrate on OPERATION SHEET 3.4
- ✓ Provide guided practice on OPERATION SHEET 3.4
- ✓ Let learner read and perform individual practices on OPERATION SHEET 3.4
- ✓ Use PPT, handouts, and poster.
- ✓ Let learner read the INFORMATION SHEET 3.4
- ✓ Let learner read the OPERATION SHEET 3.4
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=Gh7gWJAvOvs> to learn about what is caster?
- ✓ Provide link <https://www.youtube.com/watch?v=CXfswpy7Oek/> <https://www.youtube.com/watch?v=wLbs8kBXgrw> to learn caster angle | mechanical trail, how does the steering wheel automatically return to its center

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.4
- ✓ Let learner read and perform OPERATION SHEET 3.4 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 3.4 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write short notes as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.4 through Google classroom.
- ✓ Let learner read the OPERATION SHEET 3.4 and assess according to their understanding.

- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 3.4 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=Gh7gWJAvOvs> (caster wheel alignment).
- ✓ <https://www.youtube.com/watch?v=CXfswpy7Oek/>
<https://www.youtube.com/watch?v=wLbs8kBXgrw> (Caster angle, mechanical trail, how the steering wheel automatically returns to its center)

Chapter 4: Carrying out wheel balancing

A. Competency/Competencies:

- i. Identify the tread wears as per the standard procedures for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
4.1.1 Describe tire. 4.1.2 State the function of the tire. 4.1.3 List the types of the tire. 4.1.4 Illustrate the construction of the tire. 4.1.5 Explain the specification of the tire. 4.1.6 List the defects of tire wear pattern. 4.1.7 Explain the symptoms and causes of tire wear. 4.1.8 Perform inspection on tire wear Notes: <i>Ensure that the vehicle is supported with a safety stand in the correct position.</i>	4.1 Performing inspection on tire wear Overview: Besides being able to perform inspection on tire wear, the learners can acquire information on the function, types, construction, specification of tire, defects of tire wear pattern, symptoms and causes of tire wire.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 4.1
- ✓ Let learner Read and perform SKILL SHEET 4.1:
- ✓ Demonstrate on OPERATION SHEET 4.1
- ✓ Provide guided practice on OPERATION SHEET 4.1
- ✓ Let learner read and perform individual practices on OPERATION SHEET 4.1
- ✓ Use PPT, handouts, poster, and short video clips.
- ✓ Let learner read the INFORMATION SHEET 4.1
- ✓ Let learner read the OPERATION SHEET 4.1
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=6iM-79R1Da0> to learn about professional tire inspection and service.
- ✓ Provide link <https://www.youtube.com/watch?v=FaDAqcJKntE> to learn tire wear and diagnosis.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.1
- ✓ Let learner read and perform OPERATION SHEET 4.1 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.1 and assess their understanding.

- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and asses as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write short notes as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.1 through Google classroom.
- ✓ Let learner read the OPERATION SHEET 4.1 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 4.1 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=6iM-79R1Da0> (professional tire inspection and service).
- ✓ <https://www.youtube.com/watch?v=FaDAqcJKntE> (tire wear and diagnosis)

A. Competency/Competencies:

- i. Determine the imbalance wheel as per the standard procedures in any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
4.2.1 Define wheel balancing. 4.2.2 State the purpose of the static test. 4.2.3 Explain the effects of wheel balancing. 4.2.4 Perform static test drive Notes: <i>Ensure that the vehicle is jacked up at the correct position.</i>	4.2 Performing static test drive Overview: Besides knowing about wheel balancing, purpose and effects of wheel balancing, the learner can acquire the technique of performing static test drive.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 4.2
- ✓ Let learner read and perform individual practices on OPERATION SHEET 4.2
- ✓ Use PPT, handouts, and poster. Give a short video clip on the static test.
- ✓ Let learner read the INFORMATION SHEET 4.2

- ✓ Let learner read the OPERATION SHEET 4.2
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link
<https://www.derekweaver.com/learn/wheelbalancer/#:~:text=Static%20balancing%2C%20also%20called%20single,heavy%20spot%20on%20the%20tire>. To learn about best wheel balancing methods.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.2
- ✓ Let learner read and perform OPERATION SHEET 4.2 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.2 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments frequently.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.2 through Google classroom.
- ✓ Let learner read the OPERATION SHEET 4.2 and assess according to their understanding.
- ✓ Let learner solve and submit answers to SAMPLE SELF CHECK 4.2 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.derekweaver.com/learn/wheelbalancer/#:~:text=Static%20balancing%2C%20also%20called%20single,heavy%20spot%20on%20the%20tire>. (Best wheel balancing methods)

A. Competency/Competencies:

- i. Determine the faults in the wheel as per the standard procedures for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
4.3.1 State the importance of performing pre-driving checks. 4.3.2 Explain the purpose of the dynamic test. 4.3.3 Perform dynamic test drive Notes: <i>Ensure that all safety factors are followed while driving on the highway.</i>	4.3 Performing dynamic test drive Overview: Besides knowing about importance of performing pre-driving checks and purpose of dynamic test drive, the learners can acquire the technique of performing dynamic test drive.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 4.3
- ✓ Let learner read and perform individual practices on OPERATION SHEET 4.3
- ✓ Use PPT, handouts, and poster.
- ✓ Give a short video clip on how to do the dynamic test.
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Let learner read the INFORMATION SHEET 4.3
- ✓ Let learner read the OPERATION SHEET 4.3
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=Ovr9GuwMyr4> to learn about dynamic wheel balancing.
- ✓ Provide link <https://www.youtube.com/watch?v=DQxVAssnbp8> to learn wheel balancing.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.3
- ✓ Let learner read and perform OPERATION SHEET 4.3 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.3 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write short notes as homework after every session.

- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.3 through Google classroom.

- ✓ Let learner read the OPERATION SHEET 4.3 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 4.3 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=Ovr9GuwMyr4> (dynamic wheel balancing).
- ✓ <https://www.youtube.com/watch?v=DQxVAssnbp8>(wheel balancing).

A. Competency/Competencies:

- i. Eliminate the problems related to unbalanced wheel and Wheel is balanced by adding counterweight(s) incorrect position for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
4.4.1 State the purpose of wheel balancing. 4.4.2 State the purpose of counterweight. 4.4.3 Explain the causes and effects of unbalance wheel. 4.4.4 Explain the proper handling of the wheel balancing machine. 4.4.5 Operate wheel balancing machine. 4.4.6 Perform wheel balancing Notes: <i>Ensure to check the machine before operation.</i>	4.4 Performing wheel balancing Overview: Besides knowing about purpose of counterweight, causes and effects of unbalanced wheel, the learners can acquire the technique of how to handle wheel balancing machine and to perform wheel balancing.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 3.4
- ✓ Let learner read and perform SKILL SHEET 4.4
- ✓ Let learner read and perform individual practices on OPERATION SHEET 3.4
- ✓ Let learner read and perform JOB SHEET 4.4
- ✓ Use PPT, handouts, and poster.
- ✓ Let learner read the INFORMATION SHEET 4.4

- ✓ Let learner read the OPERATION SHEET 4.4
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.baierl.com/out-of-balance-tires-pittsburgh-pa/> to learn about what causes tires to be out of balance?
- ✓ Provide link <https://www.youtube.com/watch?v=awOMTYDptfk> to learn how to perform wheel alignment by yourself.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.4
- ✓ Let learner read and perform SKILL SHEET 4.4
- ✓ Let learner read and perform OPERATION SHEET 4.4 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.4 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.4 through Google classroom.
- ✓ Let learner read the OPERATION SHEET 4.4 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 4.4 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.baierl.com/out-of-balance-tires-pittsburgh-pa/> (What causes tires to be out of balance?)
- ✓ <https://www.youtube.com/watch?v=awOMTYDptfk> (How to perform wheel alignment by yourself)

MODULE IV: OVERHAULING POWER OR DRIVE TRAIN

Chapter 1: Servicing propeller shaft components

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
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. Notes: <i>Ensure to use safety measures.</i>	1.1 Changing propeller shaft Overview: The topic covers the information on components of power train, mechanism of transmission power flow, function and types of propeller shaft, purpose of slip joints, components of propeller shaft and its functions and changing of propeller shaft.

C. Learning Experiences:

- ✓ 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 learner perform according to the DEMO++ performance guide
- ✓ Let learner solve the SAMPLE SELF CHECK 1.1
- ✓ Let learner read the INFORMATION SHEET 1.1.
- ✓ Let learner go through OPERATION SHEET 1.1.
- ✓ Provide handouts and PPT slides through Google Classroom or any other social media platforms.
- ✓ Provide 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:

- ✓ Make learner to perform OPERATION SHEET 1.1
- ✓ Ask learner 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.
- ✓ Ask learner 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:

- ✓ 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. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
1.2.1 Explain the purpose of 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 Notes: <i>Ensure to use appropriate PPE</i>	1.2 Checking propeller shaft run out Overview: Besides knowing about the purpose of checking propeller shaft run out and function of counter weight on propeller shaft, the learners can acquire the technique on checking propeller shaft run out.

C. Learning Experiences:

- ✓ Let learner read and explain the INFORMATION SHEET 1.2 in a group using board, PPT, and charts.
- ✓ Demonstrate and make the learner perform OPERATION SHEET 1.2 according to the DEMO++ performance guide.
- ✓ Let learner solve the SAMPLE SELF CHECK 1.2
- ✓ Let learner read the INFORMATION SHEET 1.2.

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

D. Assessment:

- ✓ Assess the learners' ability to perform OPERATION SHEET 1.2 using a practical checklist and rubrics.
- ✓ Ask learner 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.
- ✓ Ask learner 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:

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

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
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 Note: Ensure to use hand gloves.	1.3 Changing cross bearing Overview: Besides knowing about function of cross bearing, types of U-joints and parts of cross-bearing, the learners can acquire the technique on changing cross-bearing.

C. Learning Experiences:

- ✓ Explain the INFORMATION SHEET 1.3
- ✓ Demonstrate and let the learner perform OPERATION SHEET 1.3
- ✓ Let learner solve SAMPLE SELF CHECK 1.3
- ✓ Use handout and PPT.
- ✓ Let learner read the INFORMATION SHEET 1.3

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

D. Assessment:

- ✓ Assess 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.
- ✓ Let learner 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:

- ✓ Competency-Based Learning Materials for class XI.
- ✓ 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. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
1.4.1 State function of centre bearing. 1.4.2 Explain the construction of centre bearing. 1.4.3 Change centre bearing. Notes: <i>Ensure to use gloves</i>	1.4 Changing centre bearing Overview: Besides knowing about function and construction of centre bearing, the learners can acquire the technique of changing centre bearing

C. Learning Experiences:

- ✓ Read and explain the INFORMATION HSEET 1.4 using PPT, handouts, and CBLM.
- ✓ Demonstrate and let the learner perform OPERATION SHEET 1.4
- ✓ Take learner to nearby TTI to perform OPERATION SHEET 1.4 with the help of TTI instructors.
- ✓ Let learner read the INFORMATION SHEET 1.4.
- ✓ Let learner go through OPERATION SHEET 1.4.
- ✓ Let learner solve and submit SAMPLE SELF CHECK 1.4, additional questions and write notes on resources provided 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:

- ✓ As soon as the learner are aware of center bearing, ask learner 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 learner as per the rubrics, etc. Provide necessary feedback and intervention based on an assessment of the model.
- ✓ Let learner 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 learner submit answers through Google classroom.

E. Resources:

- ✓ Competency-Based Learning Materials for Class XII Handouts and Power point 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. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning Objectives	Topic
1.5.1 Explain the symptoms, causes, and remedies of Propeller shaft failure. 1.5.2 Troubleshoot propeller shaft failure.	1.5 Troubleshooting propeller shaft failure Overview: Besides knowing about the symptoms, causes, and remedies of propeller shaft failure, the learners can acquire the methods of troubleshooting propeller shaft failure.

C. Learning Experiences:

- ✓ Explain the INFORMATION SHEET 1.5 and let learner take note while explaining.
- ✓ Demonstrate and let the learner perform OPERATION SHEET 1.5: on troubleshoot propeller shaft failure.
- ✓ Let learner solve SAMPLE SELF CHECK 1.5
- ✓ Let learner solve SAMPLE SELF CHECK 1.5
- ✓ Use PPT and handouts.
- ✓ Let learner read the INFORMATION SHEET 1.5
- ✓ Let learner go through OPERATION SHEET 1.5
- ✓ Let learner solve SAMPLE SELF CHECK 1.5
- ✓ Let learner go through the learning materials provided to learners such as PPT slides, CBLM, and handouts.
- ✓ Provide the web link to the learner <https://www.youtube.com/watch?v=tpkkg3J73dY> & <https://www.youtube.com/watch?v=iDPp0MgR2bc> to learn about symptoms/ problems of driveshaft failures.

D. Assessment:

- ✓ 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.
- ✓ Let learner write a brief note on symptoms, causes, and remedies of propeller shaft after going through the learning materials provided to learner and submit through Google Classroom.
- ✓ Assess the given question & answers and notes submitted through social medias (Telegram, WeChat, Google Classroom, Messenger).
- ✓ Conduct an online quiz.

E. Resources:

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

Chapter 2: Servicing final drive and differential Components

A. Competency/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.

B. Learning objectives/Topic:

Learning objectives	Topic
2.1.1 State function of gear oil. 2.1.2 List properties of gear oil. 2.1.3 Explain classification and specification gear oil. 2.1.4 Change transmission oil. Note: ✓ <i>Ensure to dispose of used gear oil at the designated container.</i> ✓ <i>Ensure to use hand gloves.</i>	2.1 Changing transmission oil Overview: Besides knowing about function, properties, classification and specification of gear oil, the learners can know how to change the transmission oil.

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 2.1 with the help of handouts, CBLM, pictures, PPT, and group discussion.
- ✓ Demonstrate and let the learner perform OPERATION SHEET 2.1 using the DEMO++ performance guide.
- ✓ Let learner solve SAMPLE SELF CHECK 2.1
- ✓ Let learner read the INFORMATION SHEET 2.1
- ✓ Let learner go through OPERATION SHEET 2.1
- ✓ Let learner solve SAMPLE SELF CHECK 2.1
- ✓ Upload PPT, pictures, DEMO++ performance guide, short video clips which demonstrate the OPERATION SHEET 2.1
- ✓ Provide the web link to the learner <https://gcoclubewest.ca/changing-transmission-fluidregularly/#:~:text=Just%20like%20engine%20oil%2C%20transmission,your%20transmission%20is%20lubricated%20properly> that explains the reason for changing transmission oil regularly.
- ✓ Provide the link <https://www.youtube.com/watch?v=q-nhSpJiYyE> 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:

- ✓ 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 2.1
- ✓ Assess the learners' ability to perform OPERATION SHEET 2.1 as per the rubrics or practical checklist.
- ✓ Give and Let learner solve the questions as well as SAMPLE SELF CHECK 2.1 from CBLM and submit through Google classroom.
- ✓ Let learner develop notes after receiving every learning material and submit learner through Google classroom.

E. Resources:

- ✓ 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> (Reason for changing transmission oil regularly).
- ✓ <https://www.youtube.com/watch?v=q-nhSpJiYyE> (Procedure to change transmission oil).
- ✓ <https://transmastersautocare.com/transmission-fluid-types/> (specification of transmission oil for different vehicles).

A. Competency/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.

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

Learning objectives	Topic
2.2.1 Define transmission system. 2.2.2 Explain functions of transmission system. 2.2.3 List types of transmission system. 2.2.4 List types of manual transmission. 2.2.5 Use transmission jack. 2.2.6 Replace transmission Note: Ensure to use hand gloves.	2.2 Replacing transmission Overview: The topic covers the information on function, types of transmission system, types of manual transmission and technique of replacing transmission.

C. Learning Experiences:

- ✓ Read and explain INFORMATION SHEET 2.2 using handouts, display pictures (transmission system), videos (the procedure to replace transmission assembly), PPT, and quiz.
- ✓ Demonstrate and let the learner perform OPERATION SHEET 2.2 as per the DEMO++ performance guide.
- ✓ Let learner solve the SAMPLE SELF CHECK 2.2 as classwork.

- ✓ Provide handouts, pictures (transmission system), case study, and DEMO++ performance guide.
- ✓ Let learner read the INFORMATION SHEET 2.2
- ✓ Let learner go through OPERATION SHEET 2.2
- ✓ Let learner solve the SAMPLE SELF CHECK 2.2 as classwork.
- ✓ Provide handouts, pictures (transmission system), case study, and DEMO++ performance guide.

D. Assessment:

- ✓ Assess the learners' ability through the class test, notes, assignments, and responses in the classroom.
- ✓ Let learner solve the SAMPLE SELF CHECK 2.2 and other questions as well.
- ✓ Assess the learners' ability to determine the faults and perform the OPERATION SHEET 2.2
- ✓ Let learner solve SAMPLE SELF CHECK 2.2 from CBLM and submit through Google Classroom.
- ✓ Conduct an online quiz.

E. Resources:

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

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
2.3.1 Illustrate construction of manual transmission. 2.3.2 Explain the construction and operation of synchronizing unit. 2.3.3 Explain power flow in transmission. 2.3.4 List types of gear used in manual transmission. 2.3.4 Explain the calculation of gear ratio. State functions of transmission components. Explain the gear shifting mechanism. 2.3.7 Use oil seal remover. Use bearing puller. Disassemble transmission components Note: Ensure to use hand gloves.	2.3 Disassembling transmission components Overview: Besides knowing about construction and operations of transmission, the learners can acquire the methods and procedure of disassembling transmission components.

C. Learning Experiences:

- ✓ Let learner do group presentations, quiz, brainstorming, and demonstration.

- ✓ Read the INFORMATION SHEET 3.3 using PPT, handouts, and flipcharts.
- ✓ Demonstrate SKILL SHEET 3.3(a)
- ✓ Read, demonstrate SKILL SHEET 2.3(b)
- ✓ Visit nearby TTIS, demonstrate using DEMO ++ performance guide, and let the learner perform OPERATION SHEET 3.3
- ✓ Let learner read the INFORMATION SHEET 3.3
- ✓ Let learner go through OPERATION SHEET 3.3
- ✓ Let learner go through SKILL SHEET 3.3(a)
- ✓ Let learner go through SKILL SHEET 3.3 (b)
- ✓ Let learner solve SAMPLE SELF CHECK 3.3
- ✓ Upload PPT, handouts, short video clips (synchronization of transmission gears) and DEMO ++ performance guide through Google classroom.
- ✓ Make learner to watch the provided web link <https://www.edmunds.com/car-technology/manual-transmissionbasics.html> on working of transmission.
- ✓ Provide the link <https://www.artofmanliness.com/articles/gearhead-101understanding-manual-transmission/> & <https://www.youtube.com/watch?v=wCu9W9xNwtI> that elaborate on power flow and gear ratio in transmission.

D. Assessment:

- ✓ Use rubrics to assess the learners' understanding by conducting the class tests, give assignments, questions and let learner do the presentations.
- ✓ Assess the learners' ability to perform OPERATION SHEET 3.3 using a practical checklist or rubrics.
- ✓ And also assess their practical reports as per the rubrics.
- ✓ Conduct online quizzes, give assignments such as questions, SAMPLE SELF CHECK 3.3, case study, and let the learners submit through Google Classroom or any other social media platforms.
- ✓ Let learner develop notes after receiving every learning material and submit learner through Google Classroom.

E. Resources:

- ✓ Competency-Based Learning Materials
- ✓ 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-manualtransmission/> & <https://www.youtube.com/watch?v=wCu9W9xNwtI> (Power flow and gear ratio in transmission).

A. Competency/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.

B. Learning objectives/Topic:

Learning objectives	Topic
2.4.1 Illustrate the defects of transmission components. 2.4.2 Use feeler gauge. 2.4.3 Inspect transmission components Note: <i>Ensure proper disposal of damaged gear.</i>	2.4 Inspecting transmission components Overview: Information on the defects of transmission components are covered and the learners can know the methods of inspecting transmission components.

C. Learning Experiences:

- ✓ Read the INFORMATION SHEET 2.4
- ✓ Demonstrate SKILL SHEET 4.4 by using PPT, providing handouts, and giving group works.
- ✓ Demonstrate and let the learner perform OPERATION SHEET 2.4 on inspecting transmission components with the help of the DEMO++ performance guide and letting learner practice in a group and individually several times.
- ✓ Take the learner to nearby TTI and let learner perform their practical in TTI with the help of TTI instructors.
- ✓ Let learner read the INFORMATION SHEET 2.4
- ✓ Let learner go through SKILL SHEET 2.4
- ✓ Let learner go through the OPERATION SHEET 2.4
- ✓ Provide online content articles, handouts, short video clips, and DEMO++ performance guide.

D. Assessment:

- ✓ Assess the answers to the questions of SAMPLE SELF CHECK 2.4
- ✓ Conduct class test, group presentations, quiz, etc.
- ✓ Assess the learner's ability to perform OPERATION SHEET 2.4 based on practical checklist or rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 2.4 and submit it through Google Classroom.
- ✓ Conduct online quizzes, give assignments such as questions, case study and let the learner submit through Google Classroom or any possible social media platforms.
- ✓ Let learner develop notes after receiving every learning material and submit it through Google Classroom.

E. Resources:

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

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
2.5.1 Explain the purpose of backlash/thrust play. 2.5.2 Adjust gear backlash/thrust play. Notes: <i>Ensure to use appropriate PPE</i>	2.5 Adjusting gear backlash/thrust play Overview: Besides knowing about the purpose of backlash/thrust play, the learners can acquire the technique of adjusting gear backlash/thrust play.

C. Learning Experiences:

- ✓ Explain the INFORMATION SHEET 2.5
- ✓ Demonstrate and let the learner perform OPERATION SHEET 2.5
- ✓ Let learner solve SAMPLE SELF CHECK 2.5
- ✓ Use PPT, handouts, DEMO ++ performance guide, group discussion, and short video clips (to adjust gear backlash/thrust play).
- ✓ Read the INFORMATION SHEET 2.5
- ✓ Go through the OPERATION SHEET 2.5
- ✓ Let learner solve SAMPLE SELF CHECK 2.5
- ✓ Provide PPT slides, handouts, and short video clips (to adjust gear backlash/thrust play).

D. Assessment:

- ✓ Let learner solve the SAMPLE SELF CHECK 2.5 to assess their understanding.
- ✓ Assess their ability to perform OPERATION SHEET 2.5 and the report written in their practical book.as per the rubrics developed.
- ✓ Conduct class tests and give questions or let learner write a short note as homework after every session.
- ✓ Check the learner note that has been jot down while teaching frequently.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 2.5 through Google Classroom or any other social media platforms.
- ✓ Let learner 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:

- ✓ Competency-Based Learning Materials for class XI
- ✓ PPT, handouts, DEMO ++ performance guide, pictures, and short video clips.

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
2.6.1 Assemble manual transmission. Note: Ensure to use hand gloves	2.6 Assembling manual transmission Overview: The topic covers information on methods and procedures to assemble manual transmission.

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 2.6
- ✓ Demonstrate and let the learner perform OPERATION SHEET 2.6 as per the DEMO++ performance guide.
- ✓ Let learner solve the SAMPLE SELF CHECK 2.6
- ✓ Let learner do the presentation, group discussion, and brainstorming.
- ✓ Use PPT, handouts, DEMO++ performance guide, and short video clips (assemble transmission assembly).
- ✓ Read the INFORMATION SHEET 2.6
- ✓ Go through the OPERATION SHEET 2.6
- ✓ Let learner solve the SAMPLE SELF CHECK 2.6
- ✓ Give handouts, short video clips, case studies, and the DEMO++ performance guide.

D. Assessment:

- ✓ Let the learner answer the SAMPLE SELF CHECK 2.6.
- ✓ Assess the learners' ability to perform OPERATION SHEET 2.6 as per the practical checklist or rubrics.
- ✓ Conduct the class test, presentation, group work, and assess using rubrics developed.
- ✓ Assess the notes and assignments maintained by the learners as per the rubrics developed.
- ✓ Let learner solve the SAMPLE SELF CHECK 2.6 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 learner develop notes after receiving every learning material and submit it through Google Classroom.

E. Resources:

- ✓ Competency-Based Learning Materials for class XI

- ✓ Handouts, short video clips (assemble transmission assembly), and DEMO++ performance guide.

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
2.7.1 State the purpose of the transfer case. 2.7.2 Illustrate the construction of the transfer case. 2.7.3 List types of the transfer case. 2.7.4 Explain the operation of the full-time and part-time transfer case. 2.7.5 Overhaul transfer case Notes: <i>Ensure to use appropriate PPE</i>	2.7 Overhauling transfer case Overview: The topic covers the information about purpose, types, construction, operation of transfer case, and technique of overhauling transfer case.

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 2.7
- ✓ Demonstrate and let the learner perform OPERATION SHEET 2.7
- ✓ Let learner solve SAMPLE SELF CHECK 2.7
- ✓ Use PPT CBLM.
- ✓ Let learner read the INFORMATION SHEET 2.7
- ✓ Let learner go through the OPERATION SHEET 2.7
- ✓ Let learner solve SAMPLE SELF CHECK 2.7
- ✓ 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-itsconstruction-and/> that explains the construction of transfer case.
- ✓ Share the link <https://www.aautomotive.co.nz/mechanical-servicing/diff-transferservicing/> 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:

- ✓ Assess the learners' ability to perform OPERATION SHEET 2.7 according to the inspection checklist using rubrics or practical checklist.

- ✓ Conduct class tests and viva.
Assess the learner’s conceptual understanding, let learner answer the SAMPLE SELF CHECK 2.7, and given additional questions using rubrics to provide necessary intervention.
- ✓ Assess the learner’s comprehension by letting learner answer the SAMPLE SELF CHECK 2.7 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:

- ✓ Competency-Based Learning Materials for class XI
- ✓ PPT, short video clips (operation of transfer case), and pictures (construction of transfer case).
- ✓ <https://www.quora.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. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
2.8.1 Define transaxle. 2.8.2 List types of the transaxle. 2.8.3 Replace transaxle Note: Ensure to use hand gloves.	2.8 Replacing transaxle Overview: Besides knowing about the types of transaxle, the learners can replace the transaxle.

C. Learning Experiences:

- ✓ Let the learner discuss in a group and explain the INFORMATION SHEET 2.8 Demonstrate and let the learner perform OPERATION SHEET 2.8 as per the DEMO++ performance guide.
- ✓ Let learner solve SAMPLE SELF CHECK 2.8
- ✓ Group presentation, pictures (parts of transaxle), and PPT.
- ✓ Let learner read the INFORMATION SHEET 2.8
- ✓ Let learner go through OPERATION SHEET 2.8
- ✓ Let learner solve SAMPLE SELF CHECK 2.8

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

D. Assessment:

- ✓ Assess the learners' report on particular practical OPERATION SHEET 2.8 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.
- ✓ Let the learner go through and make a note/report on learning materials / OPERATION SHEET 2.8 and send through Google Classroom.
- ✓ Assess the question & answers & the case study submitted through Google Classroom, WeChat, etc.

E. Resources:

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

A. Competency/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.

B. Learning objectives/Topic:

Learning objectives	Topic
2.9.1 Explain the construction of transaxle. 2.9.2 Explain the power flow of the transaxle. 2.9.3 Disassemble transaxle components. Note: <i>Ensure proper disposal of old transaxle fluid at the designated container.</i>	2.9 Disassembling transaxle components Overview: The topic covers information about construction, power flow of the transaxle and methods to disassemble transaxle components.

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 2.9 using PPT, CBLM, handouts.
- ✓ Let the learner perform OPERATION SHEET 2.9 as per the DEMO++ performance guide after the demonstration.
- ✓ Let learner solve the SAMPLE SELF CHECK 2.9

- ✓ Let learner read INFORMATION SHEET 2.9 and make notes.
Let learner go through OPERATION SHEET 2.9
- ✓ Give few additional questions with SAMPLE SELF CHECK 2.9
- ✓ Provide handouts and conduct class tests and quiz.
- ✓ Share the link <https://www.youtube.com/watch?v=aQb5Bg6zIG4> that shows the construction of transaxle.
- ✓ Share the link <http://www.crankshift.com/transaxle/> explains the components and failures of the transaxle.

D. Assessment:

- ✓ Assess the learners' ability to identify perform OPERATION SHEET 2.9 as per the practical checklist or rubrics.
- ✓ Let learner solve and upload the SAMPLE SELF CHECK 2.9 with few additional questions assigned to them.
- ✓ Assess their notes were taken during class hours as well as the home works.
- ✓ Conduct class tests, quizzes, and question & answer sessions.
- ✓ Let learner solve and upload the SAMPLE SELF CHECK 2.9 with few additional questions assigned through Google Classroom.
- ✓ Give a case study and submit the answer through any possible social media platforms.

E. Resources:

- ✓ Competency-Based Learning Materials for class XI
- ✓ Handouts, case studies, and PPT.
- ✓ <https://www.youtube.com/watch?v=aQb5Bg6zIG4> (Construction of transaxle).
- ✓ <http://www.crankshift.com/transaxle/> (Components and failures of transaxle).

A. Competency/Competencies:

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

B. Learning Objectives/Topic:

Learning objectives	Topic
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<p>2.10.1 State functions of transaxle components.</p> <p>2.10.2 State function of sealant.</p> <p>2.10.3 Explain the application of sealant. 2.10.4 Assemble transaxle components.</p> <p>Note:</p> <ul style="list-style-type: none"> ✓ <i>Ensure to use hand gloves.</i> ✓ <i>Ensure proper disposal of old sealant.</i> 	<p>2.10 Assembling transaxle components</p> <p>Overview: Information on functions of transaxle components, function of sealant and the application of sealant are covered. The learners can assemble transaxle components.</p>
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C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 2.10
- ✓ Demonstrate and let the learner perform OPERATION SHEET 2.10
- ✓ Let learner solve the SAMPLE SELF CHECK 2.10 and keep their notes and practical reports up to date.
- ✓ Use PPT, handouts, and DEMO++ performance guide.
- ✓ Let learner read the INFORMATION SHEET 2.10
- ✓ Let learner go through the OPERATION SHEET 2.10
- ✓ Let learner solve the SAMPLE SELF CHECK 2.10
- ✓ 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 :

- ✓ Assess the learners' ability to perform OPERATION SHEET 2.10
- ✓ Let the learner 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.
- ✓ Use rubrics to assess the learners' solved question/ answer and SAMPLE SELF CHECK 2.10 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:

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

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning Objectives	Topic
2.11.1 Explain symptoms, causes, and remedies of transmission failure. 2.11.2 Troubleshoot transmission failure	2.11 Troubleshooting transmission failure Overview: Information on symptoms, causes and remedies of transmission failure are covered besides the methods of troubleshooting transmission failure.

C. Learning Experiences:

- ✓ Let the learner discuss INFORMATION SHEET 2.11 in a group/pair and do the presentation.
- ✓ Let learner read and perform OPERATION SHEET 2.11 and let learner practice individually.
- ✓ Let learner solve the SAMPLE SELF CHECK 2.11
- ✓ Use PPT, flipchart, or board.
- ✓ Let learner read INFORMATION SHEET 2.11
- ✓ Let learner go through OPERATION SHEET 2.11
- ✓ Let learner solve the SAMPLE SELF CHECK 2.11
- ✓ Provide handouts 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

- ✓ Assess the learners' ability to explain the INFORMATION SHEET 2.11 through the presentation.
- ✓ Assess the learners' ability to perform OPERATION SHEET 2.11 as per the practical checklist or rubrics.
- ✓ Assess the learner's conceptual understanding by letting the learner to answer the SAMPLE SELF CHECK 2.11 and case study.
- ✓ Conduct class tests and viva.
- ✓ Assess the learner's conceptual understanding by letting the learners' answer the SAMPLE SELF CHECK 2.11 and let learners submit through Google Classroom or any other social media platforms.
- ✓ Let learner write the succinct notes and submit it through Google Classroom

E. Resources:

- ✓ Competency-Based Learning Materials for Class XI

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

Chapter: 3 Interpreting technical drawing

A. Competency/Competencies:

- i. Draw isometric views, orthographic projections, and mechanical machine parts

B. Learning Objectives/Topic:

Learning objectives	Topic
3.1.1 Describe sectional views. 3.1.2 State the purpose of sectional views. 3.1.3 State the rules of sectioning. 3.1.4 Describe auxiliary views. 3.1.5 List the types of auxiliary views. 3.1.6 State the purpose of auxiliary views. Notes: ✓ <i>Ensure clean and neatness of drawing.</i> ✓ <i>Ensure Proper handling of drawing instruments.</i>	3.1 Drawing sectional view for different joint Overview: Information on sectional views and auxiliary view are covered besides the techniques to draw sectional view for different joints.

C. Learning Experiences:

- ✓ Let learner read INFORMATION SHEET 3.1.
- ✓ Provide link <https://youtu.be/0x4Mq3plkEw/> https://youtu.be/vZbrcAGOB_o to understand how sectional view and auxiliary views are drawn.
- ✓ Let learner performs OPERATION SHEET 3.1 individually.
- ✓ Let learner solve SAMPLE SELF CHECK 3.1.
- ✓ Give additional problem-solving.
- ✓ Let learner read INFORMATION SHEET 3.1
- ✓ Provide links <https://youtu.be/0x4Mq3plkEw/> and https://youtu.be/vZbrcAGOB_o to learn how sectional view and auxiliary views are drawn.
- ✓ Let learner performs OPERATION SHEET 3.1 individually.
- ✓ Let learner solve SAMPLE SELF CHECK 3.1.
- ✓ Give additional problem-solving.

D. Assessment:

- ✓ Assess the learners' performance on OPERATION SHEET 3.1.
- ✓ Assess the learner's conceptual understanding of drawing sectional views and auxiliary views using a rubric.
- ✓ Provide necessary feedback and intervention based on the rating from the rubric.
- ✓ Assess the learners' response to SAMPLE SELF CHECK 3.1.and additional questions.
- ✓ Assess the learners' performance on OPERATION SHEET 3.1.
- ✓ Assess the learner's conceptual understanding of drawing sectional views and auxiliary views using a rubric.

- ✓ Provide necessary feedback and intervention based on the rating from the rubric.
- ✓ Assess the learners' response to SAMPLE SELF CHECK 3.1. and additional questions uploaded in Google Classroom.

E. Resources:

- ✓ Competency-Based Learning Materials for Class XI
- ✓ <https://youtu.be/0x4Mq3plkEw> (Explanations on sectional views and how to create)
- ✓ https://youtu.be/vZbrCAGOB_o (Explanation on axillary views and how to create)

A. Competencies:

- i. Interpret simple mechanical drawing as per job requirements.

B. Learning objectives/Topic:

Learning objectives	Topic
3.2.1 Define mechanical drawing. 3.2.2 List types of mechanical drawing. 3.2.3 Explain plan, elevation, and section. 3.2.4 Interpret simple mechanical drawing Notes: ✓ <i>Ensure clean and neatness of drawing.</i> ✓ <i>Ensure Proper handling of drawing instruments.</i>	3.2 Interpreting simple mechanical drawing Overview: Information on mechanical drawing, types of mechanical drawing and definition on plan, elevation, and section are covered. The learners can interpret simple mechanical drawing .

C. Learning Experiences:

- ✓ Let learner read INFORMATION SHEET 3.2.
- ✓ Share the web link https://ocw.mit.edu/courses/mechanical-engineering/2-007-designand-manufacturing-i-spring-2009/related-resources/drawing_and_sketching/ and https://youtu.be/1_gzd-yQLuU to explore on types of mechanical drawing and angle elevation.
- ✓ Based on the information gathered, the learner draws a mind map on types of mechanical drawing and drawing elevation.
- ✓ Demonstrate the different types of mechanical drawing and elevation of drawing.
- ✓ Let the learner perform OPERATION SHEET 3.2.
- ✓ Let the learners' solve SAMPLE SELF CHECK 3.2.
- ✓ Let learner read INFORMATION SHEET 3.2
- ✓ Share the web link https://ocw.mit.edu/courses/mechanical-engineering/2-007-designand-manufacturing-i-spring-2009/related-resources/drawing_and_sketching/ and https://youtu.be/1_gzd-yQLuU to explore on types of mechanical drawing and angle elevation.

- ✓ Based on the information gathered, the learner draws a mind map on types of mechanical drawing and drawing elevation.
- ✓ Let the learner perform OPERATION SHEET 3.2
- ✓ Let the learners' solve SAMPLE SELF CHECK 3.2

D. Assessment

- ✓ Assess the learners' performance referring to OPERATION SHEET 3.2.
- ✓ Assess the mind map to assess the learner's conceptual understanding of types of mechanical drawing and drawing elevation.
- ✓ Provide necessary intervention.
- ✓ Assess the learners' response to SAMPLE SELF CHECK 3.2.
- ✓ Assess the learners' performance referring to OPERATION SHEET 3.2.
- ✓ Assess the mind map to assess the learner's conceptual understanding of types of mechanical drawing and drawing elevation.
- ✓ Provide necessary intervention.
- ✓ Assess the learners' response to SAMPLE SELF CHECK 3.2 uploaded in Google Classroom.

E. Resources:

- ✓ Competency-Based Learning Materials for Class XI REC
- ✓ https://ocw.mit.edu/courses/mechanical-engineering/2-007-design-and-manufacturing/spring-2009/related-resources/drawing_and_sketching/ (Articles on types of the mechanical drawing)
- ✓ https://youtu.be/1_gzd-yQLuU (Differences between 1st angle and 3rd angle projection)

A. Competency/Competencies:

- i. Draw development of surface.

B. Learning objectives/Topic:

Learning Objectives	Topic
3.3.1 Development of surfaces. 3.3.2 State the methods of surface development. 3.3.3 Explain the principle of surface development. Notes: ✓ <i>Ensure clean and neatness of drawing</i> ✓ <i>Ensure Proper handling of drawing instruments</i>	3.3 Drawing development of surface Overview: Information on development of surface, method of surface development and principle of surface development are covered that enable the learners to draw development of surface.

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C. Learning experiences

- ✓ Let learner read INFORMATION SHEET 3.3.
- ✓ Let the learner explore information from the following web links:
<https://youtu.be/lwlrJOHgOB8> <https://youtu.be/llj-f38rO5c> <https://youtu.be/zlblZ7dt3Dk>
- ✓ Based on the information, the learner take notes and solve the questions given in the web link <https://youtu.be/zlblZ7dt3Dk>
- ✓ Let the learner perform OPERATION SHEET 3.3 individually.
- ✓ Let learner solve SAMPLE SELF CHECK 3.3

- ✓ Let learner read INFORMATION SHEET 3.3
- ✓ Let the learner explore information from the following web links:
<https://youtu.be/lwlrJOHgOB8> <https://youtu.be/llj-f38rO5c> <https://youtu.be/zlblZ7dt3Dk>
- ✓ Based on the information, the learner take notes and solve the questions given in the web link <https://youtu.be/zlblZ7dt3Dk>
- ✓ Let the learner perform OPERATION SHEET 3.3 individually.
- ✓ Let learner solve SAMPLE SELF CHECK 3.3

D. Assessment

- ✓ Assess the learners' response to the questions given through the link.
- ✓ Assess the learners' performance referring to OPERATION SHEET 3.3.
- ✓ Assess learners' response to SAMPLE SELF CHECK 3.3.
- ✓ Provide necessary intervention.
- ✓ Assess the learners' response to the questions given through the link.
- ✓ Assess the learners' performance referring to OPERATION SHEET 3.3.
- ✓ Assess learners' response to SAMPLE SELF CHECK 3.3 uploaded in Google Classroom.
- ✓ Provide necessary intervention.

E. Resources:

Competency-Based Learning Materials for Class XI

- ✓ <https://youtu.be/lwlrJOHgOB8> (Explanation on surface development)
- ✓ <https://youtu.be/llj-f38rO5c> (Explanation on surface development)
- ✓ <https://youtu.be/zlblZ7dt3Dk> (Problems-solving on surface development)

Resources:

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

Class XII

MODULE V: OVERHAULING POWER OR DRIVE TRAIN

Chapter 3: Servicing wheel bearing and axle shaft components

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
<p>3.1.1 State function of the wheel bearing.</p> <p>3.1.2 List types of the wheel bearing.</p> <p>3.1.3 Explain the construction of wheel bearing assembly.</p> <p>3.1.4 Explain components of the wheel hub assembly and their functions.</p> <p>3.1.5 Explain the purpose of hub greasing.</p> <p>3.1.6 Explain the purpose of bearing preload.</p> <p>3.1.7 Overhaul wheel hub assembly.</p> <p>Notes:</p> <ul style="list-style-type: none">✓ <i>Use of preload gauge.</i>✓ <i>Ensure proper disposal of used grease.</i>✓ <i>Ensure to use hand gloves.</i>	<p>3.1 Overhauling wheel hub assembly</p> <p>Overview: The topic is about function and types of wheel bearing, construction of wheel bearing assembly, components of wheel hub assembly and its functions, purpose of hub greasing and bearing preload. The learners can overhaul wheel hub assembly.</p>

C. Learning Experiences:

- ✓ Let learner read INFORMATION SHEET 3.1
- ✓ Demonstrate and let the learner perform OPERATION SHEET 3.1
- ✓ Let learner solve the SAMPLE SELF CHECK 3.1
- ✓ Use PPT, handouts, display pictures (hub greasing), and short video clips (how to give preload).
- ✓ Provide handouts and DEMO++performance guide through Google Classroom, WeChat, etc.
- ✓ Provide the web link <https://www.nationalprecision.com/info-library/technicaldata/bearing-preload/> that defines and explains the importance of preload.

D. Assessment:

- ✓ 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.

- ✓ Let the learner 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 learner answer the SAMPLE SELF CHECK 2.1 and submit learner through Google Classroom.

E. Resources:

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. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
3.2.1 State function of the axle. 3.2.2 List types of axles. 3.2.3 Illustrate construction of drive axle. 3.2.4 List types of the axle shaft. 3.2.5 State function of the axle shaft. 3.2.6 Explain the purpose of inspecting the axle shaft. 3.2.7 Replace drive/axle shaft. Notes: <ul style="list-style-type: none"> ✓ <i>Ensure proper disposal of used lubricants.</i> ✓ <i>Ensure to use hand gloves.</i> 	3.2 Replacing drive/axle shaft Overview: The skills to replace drive/axle shaft can be acquired besides knowing the functions, types, construction and purpose of inspecting the axle shaft.

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 3.2
- ✓ Demonstrate and let the learner OPEARRTION SHEET 3.2
- ✓ Let learner solve SAMPLE SELF CHECK 3.2
- ✓ 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).
- ✓
- ✓ 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-youknow/what-is-a-drive-axle#section11> that explains the axle shaft components.

D. Assessment:

- ✓ 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 3.2 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.
- ✓ Assess their notes or the task assigned to learnerbased on the links, videos, handouts, etc. provided through possible social media platforms.
- ✓ Let learner do the SAMPLE SELF CHECK 3.2 and submit through Google Classroom or any other social media platforms.

E. Resources:

- ✓ 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-driveaxle#section11> (Axle shaft components).

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
3.3.1 State function of the CV joint. 3.3.2 List types of the CV joint. 3.3.3 Explain the construction of the CV joint. 3.3.4 Explain the operation of the CV joint. 3.3.5 Change CV joint. Notes: <i>Ensure use of hand gloves.</i>	<p style="text-align: center;">3.3 Changing CV joint</p> <p>Overview: Besides knowing about the function, types, construction and operation of the CV joint, the learners can acquire the skill to change the CV joint.</p>

C. Learning Experiences:

- ✓ Let the learner discuss in a group and present the INFORMATION SHEET 3.3 using PPT and illustrated talk (showing the pictures related to a particular topic).
- ✓ Demonstrate and let the learner perform OPERATION SHEET 3.3 as per the DEMO++ performance guide.
- ✓ Let learner solve SAMPLE SELF CHECK 3.3
- ✓ Provide the link to learner that show the construction and working of the CV joint.
- ✓ <https://www.youtube.com/watch?v=vFVgOZI4Sqs>
<https://www.youtube.com/watch?v=auQ65qno2Eo>
- ✓ Share the link <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:

- ✓ Assess the learners' ability to identify and operate different types of the grinder.
- ✓ Discuss the SAMPLE SELF CHECK 3.3 in the classroom.
- ✓ Conduct the class test for theoretical as well as practical.
- ✓ Assess the end product of learner after performing the OPERATION SHEET 3.3.
- ✓ Let learner write and submit the notes on the provided learning materials and SAMPLE SELF CHECK 3.3 answers through Google Classroom or any other social media platforms.
- ✓ Conduct an online quiz.

E. Resources:

- ✓ Competency-Based Learning Materials
- ✓ 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-driveaxle#section11> (Wheel hub and axle shaft components)

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
3.4.1 Explain symptoms, causes, and remedies of wheel bearing failure. 3.4.2 Troubleshoot wheel hub assembly.	3.4 Troubleshooting wheel hub assembly Overview: The technique of troubleshooting wheel hub assembly mainly to diagnose symptoms, causes,

	and remedies of wheel bearing failure can be learnt.
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C. Learning Experiences:

- ✓ Let the learner discuss in the group and present INFORMATION SHEET 3.4 using PPT, board, display pictures of the defects of wheel hub components.
- ✓ Let the learner perform OPERATION SHEET 3.4 according to the performance guide.
- ✓ Let the learner perform the JOB SHEET 3.4
- ✓ Let learner solve SAMPLE SELF CHECK 3.4
- ✓ Provide handouts and pictures (defects of wheel hub parts).

D. Assessment:

- ✓ Conduct the class test and viva
- ✓ Let learner do a presentation, check their notes book and practical reports after every session.
- ✓ Assess the learners' ability to diagnose the faults and defects of the wheel hub as per the practical checklist.
- ✓ Assess the answers of SAMPLE SELF CHECK 3.4 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:

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

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
3.5.1 Explain symptoms causes and remedies of drive/axle shaft failure. 3.5.2 Troubleshoot drive/axle shaft failure.	3.5 Troubleshooting drive/axle shaft failure. Overview: Besides knowing about the symptoms, causes and remedies of drive/axle shaft failure, the learners can acquire the technique

	to troubleshoot drive/axle shaft failure.
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C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 3.5
- ✓ Demonstrate and let the learner perform OPERATION SHEET 3.5
- ✓ Let learner solve SAMPLE SELF CHECK 3.5
- ✓ Use PPT, handouts, short video clips (the procedure to troubleshoot axle shaft).
- ✓ 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:

- ✓ Conduct the class test to assess their understanding.
- ✓ Assess the learners' report on particular practical OPERATION SHEET 3.5 according to the rubrics.
- ✓ Assess the learners' ability to perform OPERATION SHEET 3.5 as per the practical checklist and rubrics.
- ✓ Let learner write the notes, answer the SAMPLE SELF CHECK 3.5 after going through the learning materials provided to learnervia Google Classroom or any other possible social media platforms, and assess their understanding as per the rubrics.

E. Resources:

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

Chapter 4: Servicing final drive and differential Components

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
4.1.1 Explain changing interval of differential oil. 4.1.2 Explain specification of differential oil. 4.1.3 State function of differential oil. 4.1.4 Explain the classification of differential oil. 4.1.5 Change differential oil <i>Note: Ensure to use hand gloves.</i>	4.1 Changing differential oil Overview: Information on changing interval of differential oil, specification, function and classification of differential oil can be acquired besides the technique / skill of changing differential oil.

C. Learning Experiences:

- ✓ Let the learner discuss the INFORMATION SHEET 4.1 in a group and present in the class.
- ✓ Demonstrate and let the learner perform OPERATION SHEET 4.1
- ✓ Let learner solve SAMPLE SELF CHECK 4.1
- ✓ Use PPT, pictures (types of differential gear oil), DEMO++ performance guide, demonstration, and short video clips (the procedure to change oil).
- ✓ 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:

- ✓ Assess the learners' ability to perform OPERATION SHEET 4.1 as per the practical checklist and rubrics.
- ✓ Let the learner answer the SAMPLE SELF CHECK 4.1.
- ✓ Assess the learners' comprehension by conducting the class test, group presentation, and quiz as per the rubrics.
- ✓ Assess the notes and assignments maintained by the learner after every lesson.
- ✓ Let learner write and submit the notes based on the learning resources.
- ✓ Assess the answers of SAMPLE SELF CHECK 4.1 and additional questions are given through Google Classroom or any other social media platforms.

E. Resources:

- ✓ Competency-Based Learning Materials for classes XII, 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. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
4.2.1 Define final drive. 4.2.2 Define differential. 4.2.3 List types of differentials. 4.2.4 State function of the final drive. 4.2.5 State function of differential. 4.2.6 Explain the application of differential. 4.2.7 Replace differential assembly Note: ✓ <i>Ensure proper jacking position of the vehicle.</i> ✓ <i>Ensure to use hand gloves.</i>	4.2 Replacing differential assembly Overview: Information on types of differentials, function of the final drive, and application of differential can be acquired besides the skill of replacing differential assembly.

C. Learning Experiences:

- ✓ Explain the INFORMATION SHEET 4.2
- ✓ Demonstrate and let the learner perform OPERATION SHEET 4.2
- ✓ Let learner solve SAMPLE SELF CHECK 4.2
- ✓ Use PPT, handouts, demonstration, and short video clips (functions of differential assembly)
- ✓ 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:

- ✓ Let learner 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 learner to determine the defects of differential and replace as per the standard procedures.
- ✓ Assess the learners' ability to explain the INFORMATION SHEET 4.2 and perform OPERATION SHEET 4.2 as per the practical checklist and rubrics.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 4.2 through Google Classroom or any other social media platforms.
- ✓ Let learner 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:

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

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
4.3.1 List types of the final drive gear 4.3.2 Explain the construction of differential 4.3.3 Explain the working principle of differential 4.3.4 Explain differential gear ratio 4.3.5 State purpose of lock plates 4.3.6 State function of oil seal 4.3.7 Use bearing puller 4.3.8 Disassemble differential assembly. Note: <i>Ensure to use hand gloves</i>	4.3 Disassembling differential assembly Overview: Information on types, construction and working principle of differential can be acquired besides the skill to disassemble differential assembly.

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 4.3 using handouts, PPT, and short video clips (working principle of differential).
- ✓ Demonstrate and let the learner perform OPERATION SHEET 4.3 as per the DEMO++ performance guide.
- ✓ Let learner solve SAMPLE SELF CHECK 4.3
- ✓ 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:

- ✓ Assess the learner's ability to perform OPERATION SHEET 4.3 as per the rubrics developed.
- ✓ Assess the practical report on OPERATION SHEET 4.3 written in their practical book as per the rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.3 and note to assess their comprehension.
- ✓ Check the learner note that has been jot down while teaching frequently.

- ✓ Conduct class tests and viva.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.3, 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:

- ✓ 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. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
4.4.1 Define bearing pre load. 4.4.2 State purpose of bearing pre load. 4.4.3 Define backlash. 4.4.4 State purpose of backlash. 4.4.5 Explain gear tooth nomenclatures and gear contact pattern. 4.4.6 Assemble differential assembly. 3.6.7 Use SST (Differential side bearing adjuster). Note: <ul style="list-style-type: none"> ✓ Ensure to use hand gloves. ✓ Ensure to take care of drained gear oil. 	4.4 Assembling differential assembly Overview: The learner can know about bearing pre load, purpose of bearing pre load, purpose of backlash and gear tooth nomenclatures and gear contact pattern, besides acquiring the skill to assemble differential assembly.

C. Learning Experiences:

- ✓ Explain the INFORMATION SHEET 4.4
- ✓ Demonstrate and let the learner perform OPERATION SHEET 4.4 as per the DEMO++ performance guide.
- ✓ Let learner solve SAMPLE SELF CHECK 4.4
- ✓ Use handouts, CBLM, pictures (apply bearing preload and to adjust gear backlash), PPT, DEMO++ performance guide, and demonstration.
- ✓ Provide short video clips, pictures (apply bearing preload and adjust gear backlash), DEMO++ performance guide, and handouts.
- ✓ Give a link <https://www.youtube.com/watch?v=ID8QNQATrNs> that shows how to set pinion bearing preload
- ✓ Provide link <https://www.youtube.com/watch?v=d9cxw9d-css> how to set differential gear backlash.

D. Assessment:

- ✓ Assess their understanding of the lesson through the notes, class test, and question/ answer session.
- ✓ Assess the learners' ability to perform OPERATION SHEET 4.4 using observation checklist and rubrics as per the standard procedures.
- ✓ Asses the report written in their practical notebook after performing OPERATION SHEET 4.4
- ✓ Give additional questions to SAMPLE SELF CHECK 4.4, assignments, conduct online quiz, and assess the answers using rubrics.

E. Resources:

- ✓ 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=PrbWIAzol1I> (How to apply side bearing preload).

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
4.5.1 Explain symptoms, causes, and remedies of final drive/differential failure. 4.5.2 Troubleshoot final drive and differential.	4.5 Troubleshooting final drive and differential Overview: Besides knowing about the symptoms, causes, and remedies of final drive/differential failure, the learners can acquire the technique to troubleshoot final drive and differential failure.

C. Learning Experiences:

- ✓ Use handouts, CBLM, pictures (apply bearing preload and to adjust gear backlash), PPT, DEMO++ performance guide, and demonstration.
- ✓ Explain the INFORMATION SHEET 4.5
- ✓ Demonstrate and let the learner perform OPERATION SHEET 4.5 as per the DEMO++ performance guide.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.5
- ✓ Share PPT and handouts.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.5 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> that explains the common problems of differential.

D. Assessment:

- ✓ 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 4.5 as per practical checklist and rubrics.
- ✓ Let learner write a note and solve the SAMPLE SELF CHECK 4.5 with additional questions given from the learning materials provided to learner and assess their answers using rubrics.

E. Resources:

- ✓ 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-signs-of-failing-differential.php> (Explains the common problems of differential)

Chapter 5: Overhauling and servicing clutch mechanism

A. Competencies

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

B. Learning objectives/Topic:

Learning objectives	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 Note: <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 Overview: Besides getting formation about clutch system, the learners can acquire the technique to replace clutch assembly.

C. Learning Experiences:

- i. Read and explain the INFORMATION SHEET 5.1
- ii. Demonstrate and let the learner perform OPERATION SHEET 5.1
- iii. Let learner solve the SAMPLE SELF CHECK 5.1
- iv. Use PPT, handouts, and posters (clutch assembly)
- v. Share link https://www.youtube.com/watch?v=HY_PjmHRxuE that explains the operation of the clutch system.
- vi. Provide link <https://www.youtube.com/watch?v=devo3kdSPQY> that explains the operation of the clutch system.
- vii. Provide link <https://www.youtube.com/watch?v=6DL0j0eKD8Y> that explains the operation of the clutch system.
- viii. Share the web link <https://www.theengineerspost.com/what-is-clutch/> which explains the clutch system- definition, types, function, and working principle.

D. Assessment

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

- v. Ask learners to solve the SAMPLE SELF CHECK 5.1 from CBLM and send answers through Google Classroom or any other social media platforms.
- vi. 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 (Operation/ working principle of the clutch system).
- ✓ <https://www.youtube.com/watch?v=devo3kdSPQY> (Operation/ working principle of the clutch system).
- ✓ <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. . Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	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. Note: Ensure to use hand gloves.	5.2 Inspecting clutch components Overview: Besides knowing about the functions of the clutch plate, pressure plate, release bearing, pilot bearing, flywheel, release fork, construction and function of clutch plate components, the learners can acquire the technique of inspecting clutch components.

C. Learning Experiences:

- ✓ 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 learner perform OPERATION SHEET 5.2 using the DEMO++performance guide.
- ✓ Let learner solve the 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-componentsand-function.html> to learn about clutch components and their function.

D. Assessment

- ✓ 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.
- ✓ 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-andfunction.html> (Clutch components and their function).

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
5.3.1 Explain the interval of changing clutch fluid. 5.3.2 Change clutch fluid. Note: <ul style="list-style-type: none"> ✓ <i>Ensure proper disposal of used clutch fluid.</i> ✓ <i>Ensure to use hand gloves.</i> 	5.3 Changing clutch fluid Overview: The learner can get information on interval of changing clutch fluid beside acquiring the skills to change clutch fluid.

C. Learning Experiences:

- ✓ Let the learner discuss in pair and present the INFORMATION SHEET 5.3

- ✓ Read and let the learner perform OPERATION SHEET 5.3 as per the DEMO++performance guide.
- ✓ Let learner solve the SAMPLE SELF CHECK 5.3
- ✓ Use PPT and handouts.
- ✓ Based on the information obtained from the learning resources, the learner develops notes.
- ✓ Provide the link to the learner <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

- ✓ Assess the learner to perform OPERATION SHEET 5.3 as per the rubrics or practical checklist.
- ✓ Assess the solved answers of SAMPLE SELF CHECK 5.3 as per the rubrics.
- ✓ Give additional questions from CBLM, other resources such as 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.
- ✓ 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. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
<p>5.4.1 List components of the clutch master cylinder.</p> <p>5.4.2 State function clutch master cylinder.</p> <p>5.4.3 Explain the working principle of the clutch master cylinder.</p> <p>5.4.4 State function of the slave cylinder.</p> <p>5.4.5 List components of the slave cylinder.</p> <p>5.4.6 Explain the working principle of the slave cylinder.</p> <p>5.4.7 Replace clutch master cylinder kits</p> <p>Note:</p> <ul style="list-style-type: none">✓ <i>Ensure to use hand gloves and goggles.</i>✓ <i>Ensure to dispose used clutch fluid and kits in safe place.</i>	<p>5.4 Replacing clutch master cylinder kits</p> <p>Overview: This learners can know about the components, function and working principle of the clutch master cylinder and slave cylinder besides the skill of replacing clutch master cylinder kits.</p>

C. Learning Experiences:

- ✓ Let the learnerwork in group and do the presentation on INFORMATION SHEET 5.4
- ✓ Read, explain and let the learner perform OPERATION SHEET 5.4 as per the DEMO++ performance guide.
- ✓ Let learner solve SAMPLE SELF CHECK 5.4
- ✓ Use PPT, handouts, picture (master cylinder kit)
- ✓ Let the learner go through all the learning materials, explore the information, and develops notes.

D. Assessment

- ✓ Assess the learner’s understanding by letting learner do the presentation, conduct class tests, viva, and question/answer sessions.
- ✓ Let learner 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.
- ✓ 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:

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

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
<p>5.5.1 State function of the clutch cable.</p> <p>5.5.2 Explain the operation of the clutch cable.</p> <p>5.5.3 Replace clutch cable.</p> <p>Note:</p> <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>	<p>5.5 Replacing clutch cable</p> <p>Overview: The learners can know about the function and operation of the clutch cable besides being able to replace it.</p>

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 5.5 using PPT and handouts.
- ✓ Demonstrate and let the learner perform the OPERATION SHEET 5.5
- ✓ Let learner solve the SAMPLE SELF CHECK 5.5
- ✓ Provide handouts and short video clips (the procedure to replace clutch cable).

D. Assessment

- ✓ 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.
- ✓ 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:

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

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
5.6.1 Explain the purpose of adjusting clutch pedal height. 5.6.2 Explain the specification of clutch pedal free play. 5.6.3 Adjust clutch pedal free play. Note: <i>Ensure to use appropriate PPE</i>	5.6 Adjusting clutch pedal free play Overview: Information on purpose of adjusting clutch pedal height and specification of clutch pedal free play can be acquired besides being able to adjust clutch pedal free play.

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 5.6
- ✓ Read and let the learner perform OPERATION SHEET 5.6
- ✓ Let learner solve the SAMPLE SELF CHECK 5.6
- ✓ Use PPT, board, handouts, and short video clips (the procedure to adjust clutch pedal free play).
- ✓ Upload the handouts and short video clips (the procedure to adjust clutch pedal free play).
- ✓ Provide the link <https://www.youtube.com/watch?v=l4CUBB01qX8> 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.cartchautoparts.com/clutch-cable/> that explains clutch and clutch cable.

D. Assessment

- ✓ 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.
- ✓ 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:

- ✓ 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=l4CUBB01qX8> (How to adjust clutch cable).
- ✓ <https://www.autoblog.com/2016/01/05/symptoms-of-a-bad-or-failing-clutchcable/#:~:text=A%20clutch%20cable%20is%20the,transmission%20can%20be%20safely%20shifted> (Symptoms of bad clutch cable).
- ✓ <http://www.cartechautoparts.com/clutch-cable/>(Explanation on clutch and clutch cable).

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
5.7.1 Explain symptoms, causes, and remedies of clutch failure. 5.7.2 Troubleshoot clutch system failure.	5.7 Troubleshooting clutch system failure Overview: Besides knowing the information on symptoms, causes, and remedies of clutch failure, the learners can acquire the technique to troubleshoot clutch system failure.

C. Learning Experiences:

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

D. Assessment

- ✓ 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.
- ✓ 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:

- ✓ Competency-Based Learning Materials.
- ✓ Handouts.
- ✓ <https://itstillruns.com/diagnose-clutch-problems-4855239.html> (Steps to diagnose the clutch problems).

MODULE IV: SERVICING ENGINE AUXILIARY

Chapter 1: Servicing cooling system

A. Competency/Competencies:

- i. Maintain the coolant ratio as per the manufacturer’s specification for any vehicle.
- ii. Refill the coolant to specific cooling system capacity.

B. Learning objectives/Topic:

Learning objectives	Topic
1.1.1 Explain the engine auxiliary system. 1.1.2 State the function of the cooling system. 1.1.3 List the components of the cooling system. 1.1.4 Classify cooling system. 1.1.5 Explain the operation of the cooling system. 1.1.6 Define coolant. 1.1.7 State the function of the coolant. 1.1.8 List the properties of coolant. 1.1.9 Explain the water coolant ratio. 1.1.10 State the importance of using distilled water. 1.1.11 Explain the causes and effects of stray current. 1.1.12 Change coolant <i>Note: Ensure proper disposal of used coolant.</i>	1.1 Changing coolant Overview: Besides knowing about engine auxiliary system, the learners can acquire the technique to change coolant.

C. Learning Experiences:

- ✓ The learners should read INFORMATION SHEET 1.1
- ✓ Let learner read and perform OPERATION SHEET 1.1
- ✓ Used PPT, Handouts, and poster.
- ✓ Provide a short video clip on the operation of the cooling system.
- ✓ Provide handouts through Google Classroom or any other social media platforms.
- ✓ Provide the web link https://www.youtube.com/watch?v=y5p31F_dVJU that shows how engine cooling system works.
- ✓ Share the weblink <https://www.youtube.com/watch?v=V7inC4lOpGs> that explains how the cooling system works.

D. Assessment:

- ✓ Make learner perform OPERATION SHEET 1.1 and assess as per the rubric/checklist.
- ✓ Conduct class test, unit test, and viva after completing a topic.
- ✓ Ask learner to solve the SAMPLE SELF CHECK 1.1 that fulfills objectives and competency
- ✓ Give additional questions from CBLM and other resources-Google/YouTube.
- ✓ Assess learners’ notes and assignments regularly.

- ✓ Make learner perform OPERATION SHEET 1.1 and send the short video as evidence through Google Classroom or any other social media platforms.
- ✓ Ask learner to solve the SAMPLE SELF CHECK 1.1 that fulfills objectives and competency 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.
- ✓ Give case study and submit answer through the possible social media platform.

E. Resources:

- ✓ Competency-Based Learning Materials for Classes XI and XII, REC
- ✓ Handouts
- ✓ <https://www.youtube.com/watch?v=V7inC4lOpGs> (Explanation on how the cooling system works).
- ✓ https://www.youtube.com/watch?v=y5p31F_dVJU (Explanation on how engine cooling system works).

A. Competency/Competencies:

- i. Change thermostat valve as per the standard procedures/ as per the service manual.

B. Learning objectives/Topic:

Learning objectives	Topic
1.2.1 Explain the function of the thermostat valve. 1.2.2 List types of the thermostat valves. 1.2.3 Illustrate the construction of the thermostat valve. 1.2.4 Explain the operation of the thermostat valve. 1.2.5 Change thermostat valve <i>Note: Ensure proper use of hand tools.</i>	1.2 Changing thermostat valve Overview: Information on the function, types, construction and operation of the thermostat valve can be acquired besides being able to change the it.

C. Learning Experiences:

- ✓ Make the learner read INFORMATION SHEET 1.2
- ✓ Make the learner perform OPERATION SHEET 1.2
- ✓ Use handouts, PPT, and posters.
- ✓ Provide a short video clip on the construction of the thermostat valve.
- ✓ Provide web link <https://www.youtube.com/watch?v=e6GGBGAa2Hg> to learn about how thermostatic valve work.
- ✓ Upload PPT, handouts, and poster through Google Classroom.
- ✓ Let learner explore through the given web link <https://www.carengineered.com> on the thermostat valve.

D. Assessment:

- ✓ The learners should use appropriate PPE before the practical works are started.
- ✓ Assess the learners' ability to identify the different types of thermostat valve and their purposes.
- ✓ Ask learners to perform OPERATION SHEET 1.2
- ✓ Ask learners to solve the SAMPLE SELF CHECK 1.2 that fulfills objectives and competency.
- ✓ Frame questions from CBLM and other resources-Google/YouTube.
- ✓ Conduct class test and viva exam.
- ✓ Assess notes and assignment regularly.
- ✓ Make learner do a presentation on the topic and assess according to criteria developed.
- ✓ Ask learners to perform OPERATION SHEET 1.2 and send the short video as evidence through Google Classroom or any other social media platforms.
- ✓ Ask learners to solve the SAMPLE SELF CHECK 1.2 that fulfills objectives and competency from CBLM and send 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 or any other social media platforms.
- ✓ Give case study, Demo++ PG, and submit answer through Google Classroom.

E. Resources:

- ✓ Competency-Based Learning Materials for Classes XI and XII, REC
- ✓ <https://www.youtube.com/watch?v=e6GGBGaa2Hg> (How thermostatic valve work)
- ✓ <https://www.carengineered.com> (On thermostat valve).

A. Competency/Competencies:

- i. Conduct the radiator pressure testing as per the instructions specified in the performance guide for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
1.3.1 List types of leakages in a cooling system. 1.3.2 Explain causes of cooling system leakage. 1.3.3 Use pressure tester. 1.3.4 Check leakages Notes: <ul style="list-style-type: none">✓ <i>Ensure safe handling of pressure tester.</i>✓ <i>Ensure that the vehicle is safely parked on level ground.</i>	1.3 Checking leakages Overview: Information on the types of leakages in a cooling system, and causes of cooling system leakage can be acquired besides acquiring the technique to check leakages.

C. Learning Experiences:

- ✓ Let the student read INFORMATION SHEET 1.3
- ✓ Provide PPT, handouts, and poster.

- ✓ Make learner read and Perform SKILL SHEET 1.3
- ✓ Let the student read and perform OPERATION SHEET 1.3
- ✓ Let the learner follow the link and explore how to find coolant leak
<https://www.youtube.com/watch?v=XInORNzAsR8>
- ✓ Upload PPT, handouts, and poster.
- ✓ Provide the link <https://www.youtube.com/watch?v=h84uKzyxdNo> to learn about diagnosing coolant leakage.
- ✓ Based on the information obtained from the web link or relevant materials, the learner should be able to answer the questions on cooling system leakages uploaded in the Google Classroom and SAMPLE SELF CHECK 1.3 from the textbook.

D. Assessment:

- ✓ Assess the learners' ability to identify the different types of thermostat valve and their purposes.
- ✓ Ask learner to perform OPERATION SHEET 1.3
- ✓ Ask learner to solve the SAMPLE SELF CHECK 1.3 that fulfills objectives and competency.
- ✓ Frame questions from CBLM and other resources-Google/YouTube.
- ✓ Conduct class test and viva exam
- ✓ Assess notes and assignment regularly.
- ✓ Make learner do a presentation on the topic and assess according to criteria developed.
- ✓ Ask learner to perform OPERATION SHEET 1.3 and send the short video as evidence through Google Classroom or any other social media platforms.
- ✓ Ask learner to solve the SAMPLE SELF CHECK 1.3 that fulfills objectives and competency from CBLM and send answers through Google Classroom or any other social media platforms.
- ✓ Give questions from CBLM and other resources-Google/YouTube and let learner submit answers through Google Classroom or any other social media platforms.
- ✓ Give case study, Demo++ PG, and submit answer through Google Classroom.

E. Resources:

- ✓ CBLM and handouts.
- ✓ <https://www.youtube.com/watch?v=h84uKzyxdNo> (diagnosing coolant leakage)
- ✓ <https://www.youtube.com/watch?v=XInORNzAsR8> (How to find coolant leak)

A. Competency/Competencies:

- i. Replace defective radiator without damaging radiator fins as per the service manual for any vehicle.

B. Learning objectives/ Broad theme / Strand/Chapter

Learning objectives	Topic
<p>1.4.1 State function of the radiator.</p> <p>1.4.2 List types of radiators.</p> <p>1.4.3 Illustrate construction of radiator.</p> <p>1.4.4 State function of the radiator cap.</p> <p>1.4.5 State function of the fan shroud.</p> <p>1.4.6 Explain the purpose of bleeding air from the cooling system.</p> <p>1.4.7 Change radiator assembly</p> <p>Note:</p> <ul style="list-style-type: none">✓ <i>Ensure to remove the radiator when the engine is cool.</i>✓ <i>Ensure proper handling of radiator fins.</i>	<p>1.4 Changing radiator assembly</p> <p>Overview: Information on the function, types, construction and operation of the radiator can be acquired besides being able to change the radiator assembly.</p>

C. Learning Experiences:

- ✓ Let learner read INFORMATION SHEET 1.4
- ✓ Let learner read and perform the OPERATION SHEET 1.4
- ✓ Use handouts, PPT, and posters.
- ✓ Provide a short video clip on the purpose of bleeding air from the cooling system.
- ✓ Instructors share a web link
https://www.researchgate.net/publication/268063531_A_Thermoelectric_Generator_Replacing_Radiator_for_Internal_Combustion_Engine_Vehicles or other resources such as video clips, handouts, etc. through Google Classroom or any other social media platforms.
- ✓ The learners should check and go through the link and other learning materials provided for clearer information on replacing radiator assembly and completes the questions assigned to them.
- ✓ <https://www.youtube.com/watch?v=GXGY4SAGnIQ> to learn about how to replace radiator assembly.

D. Assessment:

- ✓ Let learner perform OPERATION SHEET 1.4 and assess according to rubric /Checklist.
- ✓ Ask learner to solve the SAMPLE SELF CHECK 1.4
- ✓ Conduct class tests by framing the questions from CBLM and other ICT resources.

- ✓ Assess the learners' ability to explain the importance of maintaining tools and equipment safety, do's and don'ts of handling tools and equipment, by conducting the class test, letting the learner perform the task and rate learner using rubrics, etc.
- ✓ Provide necessary feedback and intervention based on the assessment of the model.
- ✓ Ask learner to perform OPERATION SHEET 1.4 and send the short video clip as a shred of evidence through Google Classroom or any other social media platforms.
- ✓ Let learner 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 the learners submit answers through Google Classroom or any other social media platforms.
- ✓ Give case study and submit answer through Google Classroom.

E. Resources:

- ✓ Competency-Based Learning Materials for Classes IX and X, REC
- ✓ Handouts, video clips, and PowerPoint presentation.
- ✓ https://www.researchgate.net/publication/268063531_A_Thermoelectric_Generator_Replacing_Radiator_for_Internal_Combustion_Engine_Vehicles (Research paper on radiator assembly)
- ✓ <https://www.youtube.com/watch?v=GXGY4SAGnIQ> (How to replace radiator assembly.)

A. Competency/Competencies:

- i. Change defective fan belt and adjust as per the standard procedures/as per the service manual for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
1.5.1 State functions of fan belt or drive belt. 1.5.2 Classify drive belt or fan belt. 1.5.3 Illustrate construction of fan belt. 1.5.4 Explain the methods for adjusting the fan belt tension or drive belt. 1.5.5 Explain the methods of checking fan belt tension. 1.5.7 List the defects of belts. 1.5.8 Use belt tension gauge 1.5.9 Change fan belt <i>Note: Ensure safe handling of belt tension gauge.</i>	1.5 Changing fan belt Overview: Information on the function, types, construction and operation of the fan belt can be acquired besides being able to change it.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 1.5
- ✓ Let learner read and perform SKILL SHEET 1.5
- ✓ Let the students read and perform OPERATION SHEET 1.5
- ✓ Provide PPT, handouts, and a short video clip.
- ✓ Share web link <https://www.youtube.com/watch?v=VxZw5PxjPMk> to learn how to change a fan belt.
- ✓ Let learner go through uncovered topics in the textbook.
- ✓ Let learner explain how they extinguish the fire in their respective places.

D. Assessment:

- ✓ Let learner perform OPERATION SHEET 1.5 and assess according to rubric
- ✓ /Checklist.
- ✓ Ask learner to solve the SAMPLE SELF CHECK 1.5
- ✓ Conduct class tests by framing the questions from CBLM and other ICT resources.
- ✓ Assess the learners' ability to explain the importance of maintaining tools and equipment safety, do's and don'ts of handling tools and equipment, by conducting the class test, letting the learner perform the task and rate learner using rubrics, etc.
- ✓ Provide necessary feedback and intervention based on the assessment of the model.

- ✓ Ask learner to perform OPERATION SHEET 1.5 and send the short video clip as evidence through Google Classroom or any other social media platforms.
- ✓ Let learner solve the SAMPLE SELF CHECK 1.5 from CBLM and send the answers through Google Classroom or any other social media platforms.
- ✓ Give questions using different sources and let the learners submit answers through Google Classroom or any other social media platforms.
- ✓ Let learner solve the question on the case study and assess answers submitted through Google Classroom.

E. Resources:

- ✓ CBLM, handouts, and poster
- ✓ <https://www.youtube.com/watch?v=VxZw5PxjPMk> (How to change a fan belt).

A. Competency/Competencies:

- i. Change water pump as per the manufacturer’s specification for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
<p>1.6.1 State functions of a water pump. 1.6.2 State types of a water pump. 1.6.3 Illustrate the construction of a water pump. 1.6.4 Explain the working principle of a water pump. 1.6.5 Change water pump assembly</p> <p>Note:</p> <ul style="list-style-type: none">✓ <i>Ensure proper disposal of used coolant and gasket.</i>✓ <i>Ensure to wear hand gloves.</i>	<p>1.6 Changing water pump assembly</p> <p>Overview: Information on the function, types, construction and operation of the thermostat valve can be acquired besides being able to change the thermostat valve and water pump assembly.</p>

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 1.6
- ✓ Provide PPT, handouts, and poster
- ✓ Let learner read and perform OPERATION SHEET 1.6
- ✓ Provide a short video clip on the working principle of the water pump.
- ✓ Provide link <https://www.youtube.com/watch?v=fAxMGtkopTc> to learn about how water pumps in cars work.
- ✓ Provide link <https://www.youtube.com/watch?v=5-V2OuceQkY> to learn about how to replace a water pump.
- ✓ Upload handouts and short video clips.

D. Assessment:

- ✓ As soon as the learner are aware of maintaining tools and equipment safety, ask learner to perform OPERATION SHEET 1.6 and keep on practicing while performing any task.
- ✓ Ask learner to solve the SAMPLE SELF CHECK 1.6
- ✓ Conduct class tests by framing the questions from CBLM and other ICT resources.
- ✓ Assess the learners' ability to explain the importance of maintaining tools and equipment safety, do's and don'ts of handling tools and equipment, by conducting the class test, letting the learner perform the task and rate learner using rubrics, etc.
- ✓ Provide necessary feedback and intervention based on the assessment of the model.
- ✓
- ✓ Ask learner to perform OPERATION SHEET 1.6 and send the short video clip as evidence through Google Classroom or any other social media platforms.
- ✓ Let learner solve the SAMPLE SELF CHECK 1.6 from CBLM and send the answers through Google Classroom or any other social media platforms.
- ✓ Give questions using different sources and let the learner submit answers through Google Classroom or any other social media platforms.

E. Resources:

- ✓ CBLM of classes XII
- ✓ <https://www.youtube.com/watch?v=fAxMGtkopTc> (How a water pump in-car works)
- ✓ <https://www.youtube.com/watch?v=5-V2OuceQkY> (How to replace a water pump).

A. Competency/Competencies:

- i. Rectify the cooling system problem is done as per the manufacturer specification for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
1.7.1 Explain the symptoms, causes, and remedies of cooling system failure. 1.7.2 Troubleshoot cooling system	1.7 Troubleshooting cooling system Overview: The learner can know about the symptoms, causes, and remedies of cooling system failure besides acquiring the technique to troubleshoot cooling system failure.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 1.7
- ✓ Use posters, pictures, and PPT.
- ✓ Let learner read and perform OPERATION SHEET 1.7
- ✓ Let learner read and perform JOB SHEET 1.7
- ✓ Provide the web link <https://www.youtube.com/watch?v=RlukJg0TJEw> to learn about diagnosing cooling system issues – overheating)
- ✓ Provide the link <https://www.youtube.com/watch?v=yENoBMRN5U4> (short video clip on how to diagnose problems in a car's cooling system)
- ✓ Provide handouts and pictures through Google Classroom, WeChat, etc.

D. Assessment:

- ✓ Let learner read and perform OPERATION SHEET 1.7 and assess according to rubric/checklist.
- ✓ Ask learner to solve the SAMPLE SELF CHECK 1.7 given in the CBLM.
- ✓ Provide necessary feedback and intervention based on the assessment of the model.
- ✓ Let the learner go through the links provided and assess the notes submitted through Google Classroom or any other social media platforms.
- ✓ Upload questions through possible social media platforms from the provided videos, handouts, CBLM, and assess their answers.
- ✓ Let the learner answer the SAMPLE SELF CHECK 1.7 and submit it through Google Classroom, etc.

E. Resources:

- ✓ CBLM, REC, handouts, PPT, and posters.
- ✓ <https://www.youtube.com/watch?v=RlukJg0TJEw>(Diagnosing cooling system issues – overheating)
- ✓ <https://www.youtube.com/watch?v=yENoBMRN5U4> (How to diagnose problems in a car's cooling system)

Chapter 2: Servicing Lubrication system

A. Competency/Competencies:

- i. Replace contaminated engine oil with the correct specification for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
<p>2.1.1 Define lubrication system.</p> <p>2.1.2 State types of the lubrication system.</p> <p>2.1.3 Classify methods of the lubrication system.</p> <p>2.1.4 Explain the construction of the lubrication system.</p> <p>2.1.5 Explain the operation of the lubrication system.</p> <p>2.1.6 Define viscosity.</p> <p>2.1.7 State functions of engine oil.</p> <p>2.1.8 List properties of engine oil.</p> <p>2.1.9 Classify the specification of engine oil.</p> <p>2.1.10 Explain the changing interval of engine oil.</p> <p>2.1.11 State purpose of the dip stick.</p> <p>2.1.12 Use oil filter wrench.</p> <p>2.1.13 Change engine oil</p> <p>Note:</p> <ul style="list-style-type: none"> ✓ <i>Ensure to dispose of the old engine oil and oil filter at the designated container.</i> ✓ <i>Ensure to wear hand gloves.</i> 	<p>2.1 Changing engine oil</p> <p>Overview: Besides knowing about lubrication system, the learners can acquire the technique to change engine oil.</p>

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 2.1
- ✓ Let learner read and perform OPERATION SHEET 2.1
- ✓ Use posters, PPT and CBLM.
- ✓ Upload handouts and short video clips.
- ✓ Provide link <https://wiki.anton-paar.com/en/engine-oil/> to learn about the viscosity of engine oil.
- ✓ Provide link <https://www.youtube.com/watch?v=NI0mFkpvAvM> / <https://www.youtube.com/watch?v=O1hF25Cowv8> to learn about how to change engine oil.

D. Assessment:

- ✓ Let learner perform OPERATION SHEET 2.1 and assess according to rubric/checklist.
- ✓ Assess their ability to identify the grade & viscosity of engine oil and its uses.
- ✓ Assess their performance based on the end product according to the rubrics developed.
- ✓ Let learner solve SAMPLE SELF CHECK 2.1

- ✓ Conduct class tests, unit tests, and viva.
- ✓ Let learner do a presentation and assess according to criteria developed.
- ✓ Assess their notes or the task assigned to learner based on the links, videos, handouts, etc. Provided through possible social media platforms.
- ✓ Let learner solve SAMPLE SELF CHECK 2.1 and submit through Google Classroom or any other social media platforms.
- ✓ Give case study and submit answer through Google Classroom.

E. Resources:

- ✓ CBLM, PPT, handouts, and posters.
- ✓ <https://www.youtube.com/watch?v=NI0mFkpvAvM/>
<https://www.youtube.com/watch?v=O1hF25Cowv8> (How to change engine oil.)
- ✓ <https://wiki.anton-paar.com/en/engine-oil/> (viscosity of engine oil).

A. Competency/Competencies:

- i. Ensure the engine oil pressure indicator on the dashboard is lit up when the ignition is at “ON” and goes off when the engine is started for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
2.2.1 State function oil pressure switch. 2.2.2 Explain the operation of the oil pressure switch. 2.2.3 Change oil pressure switch Note: ✓ <i>Ensure to use appropriate PPE</i>	2.2 Changing oil pressure switch Overview: Information on function and operation of the oil pressure switch can be acquired besides being able to change oil pressure switch.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 2.2
- ✓ Provide flip chart notes.
- ✓ Let learner read and perform OPERATION SHEET 2.2
- ✓ Use posters and PPT.
- ✓ Provide handouts, pictures, and short video clips.
- ✓ Provide the link <https://www.youtube.com/watch?v=y80MbudisX0/>
<https://www.youtube.com/watch?v=eQxLd7opjo0> (short video on oil pressure switch replacement).

D. Assessment:

- ✓ Let learner perform OPERATION SHEET 2.2 and assess their ability based on rubric/checklist.
- ✓ Let learner solve SAMPLE SELF CHECK 2.2
- ✓ Conduct the class test for theoretical as well as practical.

- ✓ Assess the answers of SAMPLE SELF CHECK 2.2, notes, and the assignments such as short answer questions given to the learner through Google Classroom or any other social media platforms.
- ✓ Let learner solve the questions on the case study and assess the answers submitted through Google Classroom.

E. Resources:

- ✓ CBLM, posters, PPT, and pictures.
- ✓ <https://www.youtube.com/watch?v=y80MbudisX0/>
<https://www.youtube.com/watch?v=eQxLd7opjo0> (Oil pressure switch replacement).

A. Competency/Competencies:

- i. Troubleshoot the faults and correct remedial action is provided as per the service manual for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
2.3.1 Explain symptoms, causes, and remedies of lubrication system failure. 2.3.2 Troubleshoot lubrication system	<p style="color: #4F81BD;">2.3 Troubleshooting lubrication System</p> <p>Overview: Information on symptoms, causes, and remedies of lubrication system failure can be acquired besides acquiring the technique to troubleshoot lubrication system failure.</p>

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 2.3
- ✓ Use PPT, handouts, posters, and short video clips.
- ✓ Let learner read JOB SHEET 2.3
- ✓ Upload handouts, pictures, and short video clips.
- ✓ Provide the web link <https://www.youtube.com/watch?v=ohESHq0yCns> to learn about lubrication system faults, causes, and remedies
- ✓ Provide link <https://www.youtube.com/watch?v=1wLzZTIP3g8> to learn about lubrication system troubleshooting

D. Assessment:

- ✓ Assess the learner's end product after performing the OPERATION SHEET 2.3 as per the rubrics developed.
- ✓ Assess the learners' ability on troubleshooting the lubrication system as per the required standards.
- ✓ Let learner solve SAMPLE SELF CHECK 2.3

- ✓ Assess the answers of SAMPLE SELF CHECK 2.3 submitted online.
- ✓ Upload the case study through Google Classroom or any other social media platforms and assess their understanding.
- ✓ Give case study and submit answer through Google Classroom.

E. Resources:

- ✓ CBLM, posters, short video clips, and case study.
- ✓ <https://www.youtube.com/watch?v=ohESHq0yCns> (Lubrication system faults, Causes, and Remedies)
- ✓ <https://www.youtube.com/watch?v=1wIzZTIP3g8> (Lubrication system troubleshooting)

Chapter 3: Servicing petrol fuel system

A. Competency/Competencies:

- i. Change petrol fuel filter as per the standard procedures for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
3.1.1 Define fuel system. 3.1.2 State types of the fuel system. 3.1.3 List the components of the fuel system. 3.1.4 State the function of the fuel filter.	3.1 Changing the petrol fuel filter Overview: The topic covers the information on petrol fuel system besides knowing the technique to change the petrol fuel filter.
3.1.5 Describe the construction of the fuel filter. 3.1.6 State the types of the petrol fuel filter. 3.1.7 Explain the changing interval of the fuel filter. 3.1.8 Change petrol fuel filter Note: <ul style="list-style-type: none"> ✓ <i>Ensure to dispose old petrol fuel filter at the designated place.</i> ✓ <i>Ensure to wear hand gloves and goggles.</i> 	

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 3.1
- ✓ Let learner read and perform OPERATION SHEET 3.1
- ✓ Use PPT, handouts, posters, and short video clips
- ✓ Let learner read INFORMATION SHEET 3.1
- ✓ Upload the handouts and pictures through Google Classroom and any other social media platforms.
- ✓ Provide the link <https://www.youtube.com/watch?v=IHmRpX8aZ2A> (to learn about how to replace your vehicle's fuel filter)
- ✓ Provide the link <https://www.youtube.com/watch?v=2YpRpCMPe6o> (to learn about fuel filters).

D. Assessment:

- ✓ Conduct the class test to assess their understanding.
- ✓ Assess the learners' report on particular practical OPERATION SHEET 3.1 according to the rubrics/ checklist developed.
- ✓ Assess the learner's ability to identify the components of the fuel system and the function of the fuel filter.
- ✓ Let learner solve SAMPLE SELF CHECK 3.1
- ✓ Give additional questions from other resources.

- ✓ Assess the answers of SAMPLE SELF CHECK 3.1 through Google Classroom and any other possible social media platforms.
- ✓ Let learner write notes based on the learning resources provided to learner and assess the notes with the help of rubrics developed.
- ✓ Give additional questions from other resources and submit answers through social media platforms.

E. Resources:

- ✓ CBLM, handouts, short video clips, and DEMO++ performance guide.
- ✓ <https://www.youtube.com/watch?v=IHmRpX8aZ2A> (How to replace vehicle's fuel filter)
- ✓ <https://www.youtube.com/watch?v=2YpRpCMPe6o> (Explanation of fuel filter).

A. Competency/Competencies:

- i. Determine the faults and service the AC pump in any vehicle as per the standard.

B. Learning objectives/Topic:

Learning objectives	Topic
3.2.1 State the function of AC pump. 3.2.2 Explain the construction of AC pump. 3.2.3 Explain the operation of AC pump 3.2.4 Service AC pump Note: ✓ <i>Ensure proper jacking position of the vehicle.</i> ✓ <i>Ensure to use hand gloves.</i>	<p style="text-align: center;">3.2 Servicing AC pump</p> <p>Overview: Information on function, construction and operation of AC pump can be acquired besides the technique to service AC pump.</p>

C. Learning Experiences:

- ✓ Explain the INFORMATION SHEET 3.2
- ✓ Demonstrate and let the learner perform OPERATION SHEET 3.2
- ✓ Let learner solve SAMPLE SELF CHECK 3.2
- ✓ Give handouts, short video clips, and the DEMO++ performance guide.
- ✓ Provide the link https://en.wikipedia.org/wiki/Fuel_pump that shows the functions and working of AC pump.

D. Assessment:

- ✓ Let learner 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 learner 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.

- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 2.3 through g Google Classroom or any other social media platforms.
- ✓ Let learner 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:

- ✓ Competency-Based Learning Materials.
- ✓ Handouts, PPT, and short video clip.
- ✓ https://en.wikipedia.org/wiki/Fuel_pump (Function and working of AC pump).

A. Competency/Competencies:

- i. Service the carburetor sequentially following the correct procedure and identified the defective parts through visual inspection as per the job requirement.

B. Learning objectives/Topic:

Learning objectives	Topic
3.3.1 Define carburettor 3.3.2 State the function of carburettor 3.3.3 State the types of carburetor 3.3.4 Explain the construction and working of carburetor 3.3.5 Ventura effect 3.3.6 Difference between the fixed and variable venture 3.3.7 Service carburetor Note: <i>Ensure to use hand gloves</i>	3.3 Servicing carburettor Overview: The learners can get the information on function, construction and working principle of carburetor besides acquiring the technique to service carburetor.

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 3.3 using handouts, PPT, and short video clips (working principle of carburetor).
- ✓ Demonstrate and let the learner perform OPERATION SHEET 3.3 as per the DEMO++ performance guide.
- ✓ Let learner solve SAMPLE SELF CHECK 3.3
- ✓ Provide short video clip (working principle of carburetor), handouts, pictures (carburetor parts), PPT, DEMO++ performance guide, and case study.
- ✓ Provide a link <https://www.youtube.com/watch?v=toVfvRhWbj8> that explains the working principle carburetor.

D. Assessment:

- ✓ 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 learner 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.
- ✓ Let learner 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:

- ✓ Competency-Based Learning Materials for classes XII
- ✓ Handouts, short video clips (working principle of carburetor), PPT, and DEMO++ performance guide.
- ✓ <https://www.youtube.com/watch?v=toVfvRhWbj8> (Working principle of carburetor)

A. Competency/Competencies:

- i. Check the exhaust gas as per the standard procedures at any time.

B. Learning objectives/Topic:

Learning objectives	Topic
3.4.1 Explain the emission control system. 3.4.2 State the types of emission control system 3.4.3 Explain the exhaust emission and its effects on inhabitant. 3.4.4 state the types of exhaust gas. Note: <ul style="list-style-type: none"> ✓ <i>Ensure to use hand gloves.</i> ✓ <i>Ensure to take care of drained gear oil.</i> 	<p style="text-align: right;">3.4 Checking exhaust gas emission</p> <p>Overview: The learner can acquire information on emission control system besides being able to check exhaust gas emission.</p>

C. Learning Experiences:

- ✓ Explain the INFORMATION SHEET 3.4
- ✓ Demonstrate and let the learner perform OPERATION SHEET 3.4 as per the DEMO++ performance guide.
- ✓ Let learner solve SAMPLE SELF CHECK 3.4
- ✓ Provide the link https://www.youtube.com/watch?v=WzFfIPK1y_E to learn about emission gas.

D. Assessment:

- ✓ 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
- ✓ Give additional questions to SAMPLE SELF CHECK 3.4, assignments, conduct online quiz, and assess the answers using rubrics.

E. Resources:

- ✓ Competency-Based Learning Materials for class XII
- ✓ Handouts.
- ✓ https://www.youtube.com/watch?v=WzFfIPK1y_E to learn about emission gas.

A. Competency/Competencies:

- i. Change accelerator cable as per the standard procedures for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
3.5.1 State the function of the accelerator cable. 3.5.2 Explain the operating mechanism of the acceleration system. 3.5.2 Change accelerator cable <i>Note: Ensure proper handling of hand tools.</i>	3.5 Changing accelerator cable Overview: Information on function and operating mechanism of acceleration system will be acquired besides the technique of change accelerator cable.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 3.5
- ✓ Demonstrate and let the learner perform OPERATION SHEET 3.5
- ✓ Use PPT, posters, pictures, demonstration, and short video clips.
- ✓ Upload handouts and pictures.
- ✓ Provide the link <https://www.youtube.com/watch?v=6d3vfF2NoE8> to learn how to replace accelerator cable and adjust it.

D. Assessment:

- ✓ Ask the learner to write notes based on their understanding from INFORMATION SHEET 3.5
- ✓ Let the learner answer the SAMPLE SELF CHECK 3.5
- ✓ Make the learner perform OPERATION SHEET 3.5 and assess according to checklist/ rubric.
- ✓ Let learner write and submit the notes based on the learning resources.
- ✓ Assess the answers of SAMPLE SELF CHECK 3.5 and the questions are given through Google Classroom or any other social media platforms.

E. Resources:

- ✓ CBLM, handouts, PPT, and short video clips.
- ✓ <https://www.youtube.com/watch?v=6d3vfF2NoE8> (How to replace accelerator cable and adjust It).

A. Competency/Competencies:

- i. Change the fuel injector as per the standard procedure for any petrol engine vehicle.
- ii. Maintain the engine idle RPM for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
3.6.1 Define the EFI system. 3.6.2 Differentiate carburetor and EFI system. 3.6.3 State advantages of EFI. 3.6.4 State the sub-system of the EFI system. 3.6.5 State function of engine sensors. 3.6.6 State function of the fuel injector. 3.6.7 List the types of the fuel injector. 3.6.8 Explain the construction of the fuel injector. 3.6.9 Explain the operation of the fuel injector. 3.6.10 Change fuel rail (fuel delivery pipe) and injector Note: Ensure hand gloves and goggles.	3.6 Changing fuel rail (fuel delivery pipe) and injector Overview: Besides knowing the technique to change fuel rail (fuel delivery pipe) and injector, the learners can know about EFI system.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 3.6
- ✓ Demonstrate on OPERATION SHEET 3.6
- ✓ Provide guided practice on OPERATION SHEET 3.6
- ✓ Let learner read and perform individual practices on OPERATION SHEET 3.6
- ✓ Use PPT, handouts, and short video clips.
- ✓ Give handouts, short video clips, and a DEMO++ performance guide.
- ✓ Give a link <https://www.youtube.com/watch?v=NuwM4BN2WZ4> to learn about how to change a fuel injector
- ✓ Provide web link <https://www.youtube.com/watch?v=DuB78Ug-GpQ> / <https://www.youtube.com/watch?v=oYXFKbirGPM> to learn about 6 signs of a bad fuel injector or failing injectors symptoms

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.6
- ✓ Let learner read and perform OPERATION SHEET 3.6 and assess according to checklist/rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 3.6 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and asses as per the rubrics developed.

- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.6 through Google Classroom.
- ✓ Let learner read the OPERATION SHEET 3.6 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 3.6 through Google Classroom or any other social media platforms.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, handouts, PPT, and short video clips.
- ✓ <https://www.youtube.com/watch?v=NuwM4BN2WZ4> (How to change a fuel injector)
- ✓ <https://www.youtube.com/watch?v=DuB78Ug-GpQ> / <https://www.youtube.com/watch?v=oYXFKbirGPM> (Signs of a bad fuel injector or failing injector's symptoms).

A. Competency/Competencies:

- i. Connect the PCV valve in the correct position as per the standard procedures for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
3.7.1 State function of PCV valve. 3.7.2 Illustrate the construction of the PCV valve. 3.7.3 Explain the operation of the PCV valve. 3.7.4 Change positive crankcase ventilation (PCV) valve. Note: <i>Ensure to use gloves.</i>	3.7 Changing positive crankcase ventilation (PCV) valve Overview: Besides acquiring the technique to change positive crankcase ventilation (PCV) valve, the learners can get information about PVC valve operation.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 3.7
- ✓ Demonstrate on OPERATION SHEET 3.7
- ✓ Provide guided practice on OPERATION SHEET 3.7
- ✓ Let learner read and perform individual practices on OPERATION SHEET 3.7
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on the operation of the PVC valve.
- ✓ Provide short video clips, handouts, pictures, PPT, DEMO++ performance guide, and case study.

- ✓ Provide link <https://www.youtube.com/watch?v=EPIfI9aZHt4> to learn about PCV valve operation.
- ✓ Provide link <https://www.youtube.com/watch?v=5Kt5ubcQaK0> to learn about (How PCV system works)

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.7
- ✓ Let learner read and perform OPERATION SHEET 3.7 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 3.7 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and asses as per the rubrics developed.
- ✓ Give questions or let learner write short notes as homework after every session.
- ✓ Check the learner note that has been jot down while teaching frequently.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.7 through Google Classroom.
- ✓ Let learner read the OPERATION SHEET 3.7 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 3.7 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, handouts, short video clips, PPT.
- ✓ <https://www.youtube.com/watch?v=EPIfI9aZHt4> (PCV valve operation).
- ✓ <https://www.youtube.com/watch?v=5Kt5ubcQaK0> (How PCV system works, testing and inspection of the PCV valve)

A. Competency/Competencies:

- i. Ensure the performance of the engine improved while conducting test drive after done with servicing fuel tank for all the vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
3.8.1 State function of the fuel tank. 3.8.2 Illustrate the construction of the fuel tank. 3.8.3 Service fuel tank Note: <ul style="list-style-type: none">✓ <i>Ensure proper storing of ignitable substances.</i>✓ <i>Ensure to wear hand gloves and goggles.</i>	3.8 Servicing fuel tank Overview: Besides acquiring the technique to carry out servicing of the fuel tank, the learners can get information on function and construction of the fuel tank.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 3.8
- ✓ Demonstrate on OPERATION SHEET 3.8
- ✓ Provide guided practice on OPERATION SHEET 3.8
- ✓ Let learner read and perform individual practices on OPERATION SHEET 3.8
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on servicing fuel tanks.
- ✓ Provide short video clips, handouts, pictures, PPT, DEMO++ performance guide, and case study.
- ✓ Provide link <https://www.youtube.com/watch?v=Liiwkwf1UIA> to learn about how to clean the fuel tank
- ✓ Provide link <https://www.youtube.com/watch?v=369co9HM1SU> to learn how to remove the fuel tank.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.8
- ✓ Let learner read and perform OPERATION SHEET 3.8 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 3.8 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and asses as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write short notes as homework after every session.
- ✓ Check the learner note that has been jot down while teaching frequently.

- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.8 through Google Classroom.
- ✓ Let learner read the OPERATION SHEET 3.8 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 3.8 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://www.youtube.com/watch?v=Liiwkwf1UIA> (How to clean the fuel tank)
- ✓ <https://www.youtube.com/watch?v=369co9HM1SU> (How to remove the fuel tank).

A. Competency/Competencies:

- i. Identify the petrol fuel system faults as per the standard procedure of any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
3.9.1 Explain the symptoms, causes, and remedies for carburetor fuel system failure. 3.9.2 Troubleshooting petrol fuel system	3.9 Troubleshooting petrol fuel system Overview: Besides knowing about the symptoms, causes, and remedies for carburetor fuel system failure, the learners can acquire the technique on troubleshooting petrol fuel system failure.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 3.9
- ✓ Demonstrate on OPERATION SHEET 3.9
- ✓ Provide guided practice on OPERATION SHEET 3.9
- ✓ Let learner read and perform individual practices on OPERATION SHEET 3.9
- ✓ Let learner read the JOB SHEET 3.9
- ✓ Use PPT, handouts, and poster.
- ✓ Provide short video bad fuel pump.
- ✓ Provide short video clips, handouts, pictures, PPT, DEMO++ performance guide, and case study.

- ✓ Provide link <https://www.youtube.com/watch?v=eD0ixuUbibE> to learn about symptoms of a bad fuel pump not starting but crank Provide

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.9
- ✓ Let learner read and perform OPERATION SHEET 3.9 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 3.9 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and asses as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write a short note as homework after every session.
- ✓ Check the learner note that has been jot down while teaching frequently.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 3.9 through Google Classroom.
- ✓ Let learner read the OPERATION SHEET 3.9 and assess according to their understanding.
- ✓ Let learner read JOB SHEET 3.9 and assess their understanding through question & answer session using zoom.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 3.9 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, handouts, short video clips, and DEMO++ performance guide.
- ✓ <https://www.youtube.com/watch?v=eD0ixuUbibE> (Symptoms of a bad fuel pump not starting but crank Provide).

Chapter 4: Servicing Diesel fuel system

A. Competency/Competencies:

- i. Install the fuel filter as per the standard procedures/manufacture's specification for any vehicle.

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

Learning objectives	Topic
4.1.1 Describe the diesel fuel system. 4.1.2 State function of diesel fuel injection system. 4.1.3 Illustrate the construction of a diesel fuel injection system. 4.1.4 Explain the operation of the diesel fuel injection system. 4.1.5 List the types of diesel fuel injection systems. 4.1.6 List the types of diesel fuel injection pumps. 4.1.7 State functions of the diesel fuel filter. 4.1.8 List the types of diesel fuel filters. 4.1.9 Illustrate the construction of a diesel fuel filter. 4.1.10 Explain the changing intervals of the diesel fuel filter. 4.1.11 Change diesel fuel filter Note: ✓ <i>Ensure to dispose of an old filter at the designated place.</i> ✓ <i>Ensure to wear hand gloves.</i>	<p style="text-align: center; color: #0070C0;">4.1 Changing the diesel fuel filter</p> <p>Overview: Information on diesel fuel system, construction and operation of the diesel fuel injection system, types of diesel fuel injection systems, types of diesel fuel injection pumps, functions, construction, types of the diesel fuel filter, and changing intervals of the diesel fuel filter can be acquired besides the technique to change diesel fuel filter.</p>

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 4.1
- ✓ Demonstrate on OPERATION SHEET 4.1
- ✓ Let learner read and perform individual practices on OPERATION SHEET 4.1
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on how to diesel fuel filter.
- ✓ Provide short video clips, handouts, pictures, PPT, DEMO++ performance guide, and case study.
- ✓ Provide link <https://www.youtube.com/watch?v=0jD0tFvJP3I> to learn about how to change of diesel fuel filter.
- ✓ Provide link https://www.youtube.com/watch?v=mO3MP_1PuzQ to learn about how fuel filters work.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.1
- ✓ Let learner read and perform OPERATION SHEET 4.1 and assess according to checklist/rubrics.

- ✓ Let learner solve the SAMPLE SELF CHECK 4.1 and assess their understanding.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.1 through Google Classroom.
- ✓ Let learner read the OPERATION SHEET 4.1 and assess according to their understanding.
- ✓ Let learner solve and submit answers to SAMPLE SELF CHECK 4.1 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, handouts, short video clips.
- ✓ https://www.youtube.com/watch?v=mO3MP_1PuzQ (How fuel filter works)
- ✓ <https://www.youtube.com/watch?v=0jD0tFvJP3I> (How to change of diesel fuel filter).

A. Competency/Competencies:

- i. Change the feed pump as per the vehicle repair manual for any vehicle.
- ii. Perform the bleeding as per the standard procedure.

B. Learning objectives/Topic:

Learning objectives	Topic
4.2.1 List the types of the hand feed pump. 4.2.2 Explain the function of the hand feed pump. 4.2.3 Explain the operation of the feed pump. 4.2.4 Change feed pump <i>Note:</i> ✓ <i>Ensure to use appropriate PPE.</i>	4.2 Changing feed pump Overview: Besides acquiring information on types, function and operation of the hand feed pump, the learners can change feed pump.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 4.2
- ✓ Demonstrate on OPERATION SHEET 4.2
- ✓ Provide guided practice on OPERATION SHEET 4.2
- ✓ Let learner read and perform individual practices on OPERATION SHEET 4.2
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on the operation of the feed pump.
- ✓ Provide short video clips, handouts, pictures, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=VVGO4PF3jCg> to learn about fuel feed pump for diesel engine.
- ✓ Provide link <https://www.youtube.com/watch?v=emBAb9f3bc> to learn about how inline injection pump works.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.2
- ✓ Let learner read and perform OPERATION SHEET 4.2 and assess according to checklist/rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.2 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.

- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write a short note as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.2 through Google Classroom.
- ✓ Let learner read the OPERATION SHEET 4.2 and assess according to their understanding.
- ✓ Let learner solve and submit answers to SAMPLE SELF CHECK 4.2 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, PPT, pictures, DEMO++ performance guide, and short video clips.
- ✓ <https://www.youtube.com/watch?v=VVGO4PF3jCg> (fuel feed pump for diesel engine).
- ✓ <https://www.youtube.com/watch?v=emBAb9f3bc> (How inline injection pump works).

A. Competency/Competencies:

- i. Ensure to deplete air from the diesel fuel system for all the vehicle

B. Learning objectives/Topic:

Learning objectives	Topic
4.3.1 State properties of diesel fuel. 4.3.2 List the types of diesel fuel. 4.3.3 State purpose of bleeding. 4.3.4 Bleed fuel system Note: Ensure to use gloves and goggles	4.3 Bleeding fuel system Overview: The learners can know about the properties and types of diesel fuel, purpose of bleeding and bleeding fuel system.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 4.3
- ✓ Demonstrate on OPERATION SHEET 4.3
- ✓ Provide guided practice on OPERATION SHEET 4.3
- ✓ Let learner read and perform individual practices on OPERATION SHEET 4.3
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on the purpose of bleeding.
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=dXX0dW6U5YY/>
<https://www.youtube.com/watch?v=dfIMxYDOPns> to learn about how to bleed or prime a Diesel fuel system?

- ✓ Provide link
https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1552&context=extension_curall to learn about bleeding air from diesel fuel lines and filters.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.3
- ✓ Let learner read and perform OPERATION SHEET 4.3 and assess according to checklist/rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.3 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write a short note as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.3 through Google Classroom.
- ✓ Let learner read the OPERATION SHEET 4.3 and assess according to their understanding.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 3.5 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ Handouts, CBLM, pictures, PPT slides
- ✓ <https://www.youtube.com/watch?v=dXX0dW6U5YY/>
<https://www.youtube.com/watch?v=dfIMxYDOPns> (How to bleed or prime a Diesel fuel system?)
- ✓ https://digitalcommons.usu.edu/cgi/viewcontent.cgi?article=1552&context=extension_curall (bleeding air from diesel fuel lines and filters)

A. Competency/Competencies:

- i. Set fuel injection timing as per the standard procedures/ as per the service manual for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
4.4.1 Illustrate the construction of fuel injection pumps. 4.4.2 Explain the working principle of fuel injection pumps. 4.4.3 Explain the working of the centrifugal governor. 4.4.4 Set fuel injection timing (in-line type) Note: Ensure appropriate use of PPE.	4.4 Setting fuel injection timing (In-line type) Overview: Information on construction of fuel injection pumps, working principle of fuel injection pumps, and working of the centrifugal governor will be acquired besides the skill of setting fuel injection timing (In-line type).

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 4.4
- ✓ Demonstrate on OPERATION SHEET 4.4
- ✓ Provide guided practice on OPERATION SHEET 4.4
- ✓ Let learner read and perform individual practices on OPERATION SHEET 4.4
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on the working principle of the fuel injection pump.
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=JSymXTP8HTg> to learn about how fuel injection pump work.
- ✓ Provide link <https://www.youtube.com/watch?v=DLcsaLWKZMk> to learn about injector timing.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.4
- ✓ Let learner read and perform OPERATION SHEET 4.4 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.4 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and asses as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write short notes as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.4 through Google Classroom.
- ✓ Let learner read the OPERATION SHEET 4.4 and assess according to their understanding.

- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 4.4 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ CBLM, handouts, pictures, and short video clips.
- ✓ <https://www.youtube.com/watch?v=JSymXTP8HTg> (How fuel injection pump works).
- ✓ <https://www.youtube.com/watch?v=DLcsaLWKZMk> (Setting injector timing)

A. Competency/Competencies:

- i. Spray the injector fuel at the correct pressure while testing for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
4.5.1 Explain the function of the fuel injector. 4.5.2 List the types of fuel injectors. 4.5.3 Illustrate the construction of the fuel injector. 4.5.4 Explain the operation of the fuel injector. 4.5.5 Service fuel injector Note: <ul style="list-style-type: none"> ✓ Use fuel injector pressure tester. ✓ Ensure safe handling of fuel injector pressure tester. ✓ Ensure to wear hand gloves and goggles. 	<p style="color: blue;">4.5 Servicing fuel injector</p> <p>Overview: Besides being able to service fuel injector the learner can acquire information on function, type construction and operation of the fuel injector.</p>

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 4.5
- ✓ Let learner read and perform JOB SHEET 4.5.
- ✓ Demonstrate on OPERATION SHEET 4.5
- ✓ Provide guided practice on OPERATION SHEET 4.5
- ✓ Let learner read and perform individual practices on OPERATION SHEET 4.5
- ✓ Use PPT, handouts, and poster.
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=P5-yxENaLDU> to learn about working of diesel fuel injector and how nozzle spray
- ✓ Provide link <https://www.sinotrukhowo.cn/diesel-injector-construction-and-operation/> to learn about the construction of fuel injector.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.5
- ✓ Let learner read and perform OPERATION SHEET 4.5 and assess according to checklist/ rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.5 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Give questions or let learner write short notes as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.5 through Google Classroom.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 4.5 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. Resources:

- ✓ Upload PPT, handouts, pictures, short video clips
- ✓ <https://www.youtube.com/watch?v=P5-yxENaLDU> (Working of diesel fuel injector and how nozzle spray)
- ✓ <https://www.sinotrukhowo.cn/diesel-injector-construction-and-operation/> (Construction of fuel injector).

A. Competency/Competencies:

- i. Maintain the plunger stroke value as per the manufacturer's standards.
- ii. Set fuel injection timing as per standard practices for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
4.6.1 Illustrate the construction of a distributor-type fuel pump. 4.6.2 Explain the operation of a distributor-type fuel pump. 4.6.3 Describe the components of the fuel injection pump. 4.6.4 Explain the operation of all speed governors. 4.6.5 Use dial gauge. 4.6.6 Set fuel injection timing (Distributor type) Notes: <i>Ensure safe handling of the dial gauge.</i>	4.6 Setting fuel injection timing (Distributor type) Overview: The learners can acquire information on construction, operation of distributor-type fuel pump, components of the fuel injection pump, and operation of all speed governors besides acquiring the technique to set fuel injection timing (Distributor type).

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 4.6
- ✓ Let learner read and perform SKILL SHEET 4.6
- ✓ Demonstrate on OPERATION SHEET 4.6
- ✓ Provide guided practice on OPERATION SHEET 4.6
- ✓ Let learner read and perform individual practices on OPERATION SHEET 4.6
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on the operation of speed governors.
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://www.youtube.com/watch?v=nM3LRV20I6c> to learn about setting fuel injection timing (Distributor type)

D. D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.6
- ✓ Let learner read and perform OPERATION SHEET 4.6 and assess according to checklist/rubrics.
- ✓ Let learner read and perform JOB SHEET 4.6 and assess according to the rubric.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.6 and assess their understanding.
- ✓ Give questions or let learner write a short note as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.6 through Google Classroom.
- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 4.6 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit succinct notes through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let learner solve the question on the case study and submit the answer through the social media platform.

E. E. Resources:

- ✓ Handouts, short video clips, CBLM, DEMO++ performance guide, and CBLM.
- ✓ <https://www.youtube.com/watch?v=nM3LRV20I6c> (Setting fuel injection timing)

A. Competency/Competencies:

- i. Diagnose the faults or problems in diesel fuel for any vehicle.

B. Learning objectives/Topic:

Learning objectives	Topic
4.7.1 Explain the symptoms, causes, and remedies for diesel fuel system failure. 4.7.2 Explain the symptoms, causes, and remedies for CRDI system failure. 4.7.3 Troubleshoot diesel fuel system	4.7 Troubleshooting diesel fuel system Overview: Besides acquiring the technique to troubleshoot diesel fuel system failure, the learners can acquire knowledge on symptoms, causes, and remedies for diesel fuel system failure, and symptoms, causes, and remedies for CRDI system failure.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 4.7
- ✓ Let learner read and perform JOB SHEET 4.7.
- ✓ Demonstrate on OPERATION SHEET 4.7
- ✓ Provide guided practice on OPERATION SHEET 4.7
- ✓ Let learner read and perform individual practices on OPERATION SHEET 4.7
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on how to diagnose faults for the diesel fuel system.
- ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
- ✓ Provide link <https://automotivediagnosticspecialties.com/tag/diesel-engine-troubleshooting-chart/> to learn about diesel engine troubleshooting chart.
- ✓ Provide link <https://www.axi-international.com/the-effects-of-diesel-fuel-contamination/> to learn about the effects of diesel fuel contamination.

D. Assessment:

- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.7
- ✓ Let learner read and perform OPERATION SHEET 4.7 and assess according to checklist/rubrics.
- ✓ Let learner solve the SAMPLE SELF CHECK 4.7 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let learner do the presentation and assess as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let learner write short notes as homework after every session.
- ✓ Let learner read and write notes after reading INFORMATION SHEET 4.7 through Google Classroom.

- ✓ Let learner solve and submit answers of SAMPLE SELF CHECK 4.7 through Google Classroom or any other social media platforms.
- ✓ Let learner write and submit a succinct note through Google Classroom or any other possible social media platforms, based on their understanding after watching the videos.

E. Resources:

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ <https://automotivediagnosticspecialties.com/tag/diesel-engine-troubleshooting-chart/> (diesel engine troubleshooting chart).
- ✓ <https://www.axi-international.com/the-effects-of-diesel-fuel-contamination/> (effects of diesel fuel contamination).

MODULE VI: PERFORMING BASIC AUTO ELECTRICAL WORKS

Chapter 1: Replacing Basic Electrical Components

A. Competencies

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

B. Learning objectives/Topic:

Learning objectives	Topic
<p>1.1.1 Define soldering.</p> <p>1.1.2 List types of soldering lead and its size.</p> <p>1.1.3 State the purpose of soldering iron.</p> <p>1.1.4 Explain the purpose of flux during soldering.</p> <p>1.1.5 Use soldering iron.</p> <p>1.1.6 Perform soldering</p> <p><i>Note: Ensure to use hand gloves, goggles, and an apron.</i></p>	<p>1.1 Performing soldering</p> <p>Overview: Besides knowing about the types of soldering lead and its size, purpose of soldering iron and purpose of flux during soldering, the learners can acquire the technique of performing soldering.</p>

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 1.1 using PPT and handouts.
- ✓ Read and demonstrate SKILL SHEET 1.1
- ✓ Demonstrate and let learner perform OPERATION SHEET 1.1
- ✓ Let learner solve the SAMPLE SELF CHECK 1.1
- ✓ Provide handouts 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

- ✓ 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 learner solve the SAMPLE SELF CHECK 1.1.
- ✓ Conduct class tests, question/answer sessions, and viva.
- ✓ Let learner 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:

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

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	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 Note: <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. Overview: Besides knowing about the basic electricity, the learners can acquire the technique of repairing wires and connectors.

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 1.2
- ✓ Demonstrate and let the learner perform the OPERATION SHEET 1.2
- ✓ Let learner solve the SAMPLE SELF CHECK 1.2
- ✓ Provide handouts and short video clips (types of wire joints).
- ✓ 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
- ✓ Ohms law.

D. Assessment:

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

E. Resources:

- ✓ 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. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
1.3.1 State function of the fuse. 1.3.2 List types of the fuse. 1.3.3 Illustrate fuse rating and color-coding. 1.3.4 Change fuse. Note: Ensure to use gloves.	1.3 Changing fuse Overview: Besides knowing about the function of the fuse, types, fuse rating and color-coding the learners can acquire the skill to change fuse.

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 1.3
- ✓ Demonstrate and let the learner perform OPERATION SHEET 1.3
- ✓ Let learner solve SAMPLE SELF CHECK 1.3
- ✓ Use handouts, pictures (automobile fuses).
- ✓ Provide the handouts through Google Classroom.
- ✓ Share the link <https://components101.com/articles/different-types-of-fuses-and-theirapplications> that explains the different types of fuses and their application.

D. Assessment

- ✓ Assess learner's ability to perform OPERATION SHEET 1.3 as per the rubrics or practical checklist.
- ✓ Let learner solve the SAMPLE SELF CHECK 1.3.
- ✓ Assess their understanding by conducting class tests and viva.
- ✓ Let learner 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 learner solve the questions on the case study and submit learner through Google Classroom.

E. Resources:

- ✓ 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. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	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 Overview: The learners can acquire information about battery, its function, and the purpose of disconnecting the negative battery terminal besides acquiring the skill of changing battery.

C. Learning Experiences:

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

- ✓ 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.
- ✓ Assess the report written in their practical notebook after performing OPERATION SHEET 2.1
- ✓ 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:

- ✓ 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 /](https://www.youtube.com/watch?v=OQGLZxPcd-o/)
<https://www.youtube.com/watch?v=R5Xa6eMAriQ> (How to change car battery).

A. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	Topic
2.2.1 Explain the construction of the battery. 2.2.1 Perform visual inspection <i>Note: Ensure to use hand gloves.</i>	2.2 Performing a visual inspection Overview: The learner can acquire the technique to perform visual inspection besides knowing the construction of the battery.

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 2.2
- ✓ Demonstrate and let the learner perform OPERATION SHEET 2.2
- ✓ Let learner solve SAMPLE SELF CHECK 2.2
- ✓ Use handouts, CBLM, DEMO++ performance guide, PPT, pictures (construction of battery)
- ✓ Provide handouts through Google Classroom or any other social media platforms.
- ✓ Provide the web link <https://batteryworld.varta-automotive.com/en-gb/how-does-carbattery-work> to learn how does a car battery work and how is it constructed?

D. Assessment

- ✓ 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.
- ✓ Let learner 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 learner and submit learner through any possible social media platforms. ✓ Conduct an online quiz.

E. Resources:

- ✓ 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. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	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 Overview: The learners can acquire information on specification of the battery and using multimeter besides knowing the skill to check battery voltage.

C. Learning Experiences:

- ✓ Read and explain the INFORMATION SHEET 2.3
- ✓ Demonstrate and let learner perform the SKILL SHEET 2.3
- ✓ Demonstrate and let learner perform the OPERATION SHEET 2.3
- ✓ Use PPT, handouts, and pictures (Circuit diagram for checking battery voltage).
- ✓ 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

- ✓ Let learner 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 note and practical reports.
- ✓ Let learner solve and the submit answers of SAMPLE SELF CHECK 2.3 through Google Classroom or any other social media platforms.
- ✓ Conduct an online quiz.

E. Resources:

- ✓ 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. Competency/Competencies:

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

B. Learning objectives/Topic:

Learning objectives	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 Note: <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 Overview: The learners can know about the purpose of jump starting, construct circuit to jump start and can perform jump starting.

C. Learning Experiences:

- ✓ Let the learners' read the INFORMATION SHEET 2.4
- ✓ Let learner read and perform SKILL SHEET 2.4
- ✓ Demonstrate and let the learner perform OPERATION SHEET 2.4
- ✓ Use PPT, handouts, and posters (Circuit of jump start).
- ✓ Provide the link <https://www.youtube.com/watch?v=il1o2hNy2hE> to learn the steps of jump-starting.

D. Assessment

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

E. Resources:

- ✓ Competency-Based Learning Material for Class XII
- ✓ Handouts and posters (Circuit of jump start).
- ✓ <https://www.youtube.com/watch?v=il1o2hNy2hE> (Perform jump starting).

A. Competency/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.

B. Learning objectives/Topic:

Learning objectives	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 Note: <i>Ensure proper handling of battery end remover.</i>	2.5 Changing battery terminal Overview: Information on function of the battery terminal, types of the battery terminal, purpose of applying petroleum jelly can be acquired besides the skill of changing battery terminal.

C. Learning Experiences:

- ✓ Let learner read the INFORMATION SHEET 2.5
- ✓ Let learner read and perform OPERATION SHEET 2.5
- ✓ Let learner read and perform JOB SHEET 2.5
- ✓ Let learner solve the SAMPLE SELF CHECK 2.5.
- ✓ Use PPT, handouts, short video clips (the procedure to change battery terminal).
- ✓ 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

- ✓ 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.
- ✓ 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 learner solve the questions on the case study and assess the answers submitted through Google Classroom.

E. Resources:

- ✓ 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