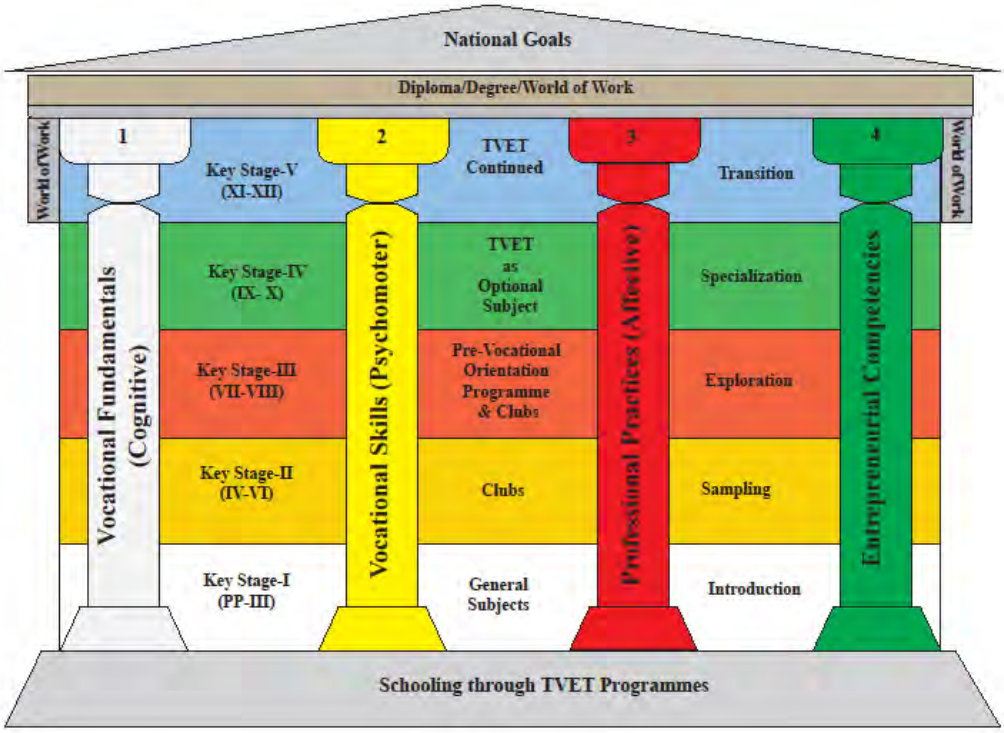
TECHNICAL AND VOCATIONAL EDUCATION AND TRAINING (TVET)

NEW NORMAL CURRICULUM

INSTRUCTIONAL GUIDE

(AUTOMOBILE)

CLASS: XI



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FOREWORD

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

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

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

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

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

Kinga Dakpa,

Director General

INTRODUCTION

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

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

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

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

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

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MODULE III: SERVICING Steering System

Chapter 1: Servicing Steering components

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

Learning objectives	Core concept(chapter/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: ✓ *Ensure steering fluid is disposed of in a designated container.*	**1.10. Replacing rack & pinion power steering gearbox**

B. 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.

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let learner read the INFORMATION SHEET 1.10
  - ✓ Give demonstration on OPERATION SHEET 1.10
  - ✓ Give guided practice on OPERATION SHEET 1.10
  - ✓ Let them 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.
- **Non-contact:**
  - ✓ Let learner read the INFORMATION SHEET 1.10
  - ✓ Let them read on 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:

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

E. Resources (online and offline):

- ✓ Use 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning Objectives	Core concept(chapter/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. 1.11.11Replace power steering belt ***Notes:***	**1.11Replacing power steering belt**

✓ *Ensure proper handling of the belt tension gauge.*	

B. 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.

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let learner read the INFORMATION SHEET 1.11
  - ✓ Let them 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.
- **Non-contact:**
  - ✓ Let learner read the INFORMATION SHEET 1.11
  - ✓ Let them read on OPERATION SHEET1.11
  - ✓ 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-fuel-contamination/ to learn about the effects of diesel fuel contamination.
  - ✓ Give additional questions from other resources such as Google, YouTube, etc.

D. Assessment:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 1.11
  - ✓ Let them read and perform OPERATION SHEET 1.11 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 1.11 and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.
  - ✓ Assess the learners' notes, assignments, etc. frequently.
  - ✓ Give questions or let them write a short note as homework after every session.
- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 1.11 through google classroom.
  - ✓ Let them read on OPERATION SHEET 1.11 and assess according to their understanding.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 1.11 through google classroom or any other social media platforms.

- ✓ Let the learners write and submit a succinct note through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

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

A. Learning objectives/ Broad theme / Strand/Chapter

Learning objectives	Core concept(chapter/topic)
1.12.12 State the types of power steering fluid. 1.12.13 List the properties of the power steering fluid. 1.12.14 State the function of the power steering fluid. 1.12.15 Change power steering fluid Notes: ✓ *Ensure old steering fluid is disposed of in the designated container.*	**1.12Changing the power steering fluid**

- ✓ **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.

- ✓ **Pedagogy/Learning experiences:**

- **Contact**:
  - ✓ Let learner read the INFORMATION SHEET 1.12
  - ✓ Let them 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.
- **Non-contact:**
  - ✓ Let learner read the INFORMATION SHEET 1.12
  - ✓ Let them read on OPERATION SHEET1.12
  - ✓ 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.

- ✓ **Assessment:**

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 1.12
  - ✓ Let them read and perform OPERATION SHEET 1.12 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 1.12 and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.
  - ✓ Assess the learners' notes, assignments, etc. frequently.
  - ✓ Give questions or let them write a short note as homework after every session.
- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 1.12 through google classroom.
  - ✓ Let them read on OPERATION SHEET 1.12 and assess according to their understanding through zoom question & answer session.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 1.12 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit a succinct note through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.
  - ✓ **Resources (online and offline):**

✓ Use 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concept(chapter/topic)
1.13.16State purpose of purging/bleeding hydraulic power steering. 1.13.17 Purging hydraulic power steering Notes: ✓ *Ensure the fluid is not spilled.*	**1.13Purging hydraulic power steering**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let learner read the INFORMATION SHEET 1.13
  - ✓ Let them 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.
- **Non-contact:**
  - ✓ Let learner read the INFORMATION SHEET 1.13
  - ✓ Let them read on OPERATION SHEET1.13
  - ✓ 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:**

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

- ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ Use 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concept(chapter/topic)
1.14.18State the function of the power steering pump. 1.14.19Illustrate the construction of the power steering pump. 1.14.20Explain the types of steering pumps. 1.14.21Explain the working operation of the power steering pump. 1.14.22 Replace power steering pump Notes: ✓ *Ensure old steering fluid is disposed of in a designated container.*	**1.14 Replacing power steering pump**

B. 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.

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let learner read the INFORMATION SHEET 1.14
  - ✓ Let them 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.
- **Non-contact:**
  - ✓ Let learner read the INFORMATION SHEET 1.14
  - ✓ Let them read on OPERATION SHEET1.14
  - ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
  - ✓ Provide link https://www.youtube.com/watch?v=4zVPkhnz6k8 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:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 1.14
  - ✓ Let them read and perform OPERATION SHEET 1.14 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 1.14 and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.
  - ✓ Assess the learners' notes, assignments, etc. frequently.
  - ✓ Give questions or let them write a short note as homework after every session.
- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 1.14 through google classroom.
  - ✓ Let them read on OPERATION SHEET 1.14 and assess according to their understanding.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 1.14 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ Use 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=AExeeo00QOQ (How power steering pumps work).

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

Learning Objectives	Core concept(chapter/topic)
1.15.1 Explain the symptoms, causes, and remedies of steering system failure. 1.15.2 Troubleshooting steering system	**1.15Troubleshooting steering system**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let learner read the INFORMATION SHEET 1.15

- ✓ Let learner read and perform JOB SHEET 1.15
- ✓ Give demonstration on OPERATION SHEET 1.15
- ✓ Give guided practice on OPERATION SHEET 1.15
- ✓ Let them 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.

- **Non-contact:**
  - ✓ Let learner read the INFORMATION SHEET 1.15
  - ✓ Let them read on 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:

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

E. Resources (online and offline):

- ✓ Use 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concept(chapter/topic)
2.1.1 Define kingpin. 2.1.2 State the function of the kingpin. 2.1.3 Explain the construction of the kingpin. 2.1.4 Remove kingpin assembly Notes: ✓ *Ensure proper handling of hand tools.* ✓ *Ensure the vehicle is safely supported with a safety stand.* ✓ *Ensure that the old grease is disposed of at the designated container.*	**2.1 Removing kingpin assembly**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 2.1
  - ✓ Give demonstration on OPERATION SHEET 2.1
  - ✓ Give guided practice on OPERATION SHEET 2.1
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 2.1
  - ✓ Use PPT, handouts, and poster.
  - ✓ Provide short video on the construction of kingpin
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 2.1
  - ✓ Let them read on 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) to learn about the function of the kingpin.

D. Assessment:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 2.1

- ✓ Let them read and perform OPERATION SHEET 2.1 and assess according to checklist/ rubrics.
- ✓ Let the learners solve the SAMPLE SELF CHECK 2.1 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let the learners do the presentation and asses as per the rubrics developed.
- ✓ Assess the learner's notes, assignments, etc. frequently.

- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 2.1 through google classroom.
  - ✓ Let them read on OPERATION SHEET 2.1 and assess according to their understanding.
  - ✓ Let them solve and submit answers to SAMPLE SELF CHECK 2.1 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ Use 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) (Function of kingpin)

✓ **Learning objectives/ Broad theme / Strand/Chapter:**

Learning objectives	Core concept(chapter/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: ✓ *Ensure proper handling of pre-load gauge.*	**2.2 Refitting kingpin assembly**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 2.2
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 2.2
  - ✓ Use PPT, handouts, and poster.
  - ✓ Provide a short video on kingpin inclination.
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 2.2
  - ✓ Let them read on 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 pin inclination angle (KPI/KPA) works.
  - ✓ Provide link https://www.youtube.com/watch?v=KkvKLXHydqQ to learn about how to replace kingpin.

D. **Assessment:**

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

E. **Resources (online and offline):**

- ✓ Use 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 (KPI/KPA) works).

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

Learning objectives	Core concept(chapter/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: ✓ *Ensure old grease is disposed of at the designated container.*	**2.3 Performing kingpin greasing**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 2.3
  - ✓ Give demonstration on OPERATION SHEET 2.3
  - ✓ Give guided practice on OPERATION SHEET 2.3
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 2.3
  - ✓ Use PPT, handouts, poster and Provide a short video
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 2.3
  - ✓ Let them read on 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:

- **Contact:**
  - F. Let learner read and write notes after reading INFORMATION SHEET 2.3
  - G. Let them read and perform OPERATION SHEET 2.3and assess according to checklist/ rubrics.
  - H. Let the learners solve the SAMPLE SELF CHECK 2.3and assess their understanding.
  - I. Assess their understanding and ability to identify the components with functions.
  - J. Let the learners do the presentation and asses as per the rubrics developed.
  - K. Assess the learner's notes, assignments, etc. frequently.
  - L. Give questions or let them write a short note as homework after every session.
- **Non-contact:**

- ✓ Let learner read and write notes after reading INFORMATION SHEET 2.3 through google classroom.
- ✓ Let them read on OPERATION SHEET 2.3 and assess according to their understanding.
- ✓ Let them solve and submit answers of SAMPLE SELF CHECK 2.3through google classroom or any other social media platforms.
- ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

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

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

Learning objectives	Core concept(chapter/topic)
2.2.1 List the components of knuckle assembly 2.2.2 State the function of knuckle assembly 2.2.3 Explain the function of the knuckle oil seal 2.2.4 Replace knuckle assembly Notes: ✓ *Ensure proper handling of hand tools*	**2.4 Replacing knuckle assembly**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 2.4
  - ✓ Let learner read and perform JOB SHEET 2.4
  - ✓ Give demonstration on OPERATION SHEET 2.4
  - ✓ Give guided practice on OPERATION SHEET 2.4
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 2.4
  - ✓ Use PPT, handouts, and poster.
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 2.4
  - ✓ Let them read on 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:

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

E. Resources (online and offline):

- ✓ Use 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concept(chapter/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 Performing pre-alignment**

3.1.6 Use a Tire pressure gauge. 3.1.7 Perform pre-alignment *Notes:* ✓ *Ensure compressed air is used for the right application.*	

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 3.1
  - ✓ Let learner read and Perform SKILL SHEET 3.1
  - ✓ Give demonstration on OPERATION SHEET 3.1
  - ✓ Give guided practice on OPERATION SHEET 3.1
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 3.1
  - ✓ Use PPT, handouts, and poster.
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 3.1
  - ✓ Let learner read SKILL SHEET 3.1
  - ✓ Let them read on 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-car-alignment/ 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:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.1
  - ✓ Let them read and perform OPERATION SHEET 3.1 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 3.1and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.
  - ✓ Assess the learners' notes, assignments, etc. frequently.
  - ✓ Give questions or let them write a short note as homework after every session.
- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.1 through google classroom.

- ✓ Let them read on OPERATION SHEET 3.1 and assess according to their understanding.
- ✓ Let them solve and submit answers to SAMPLE SELF CHECK 3.1 through google classroom or any other social media platforms.
- ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ Use 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)

- ✓ **Learning objectives/ Broad theme / Strand/Chapter:**

Learning objectives	Core concept(chapter/topic)
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 Notes: ✓ *Ensure the vehicle is wedged and engages the parking brake securely.* ✓ *Ensure proper handling of SST (Steering wheel lock).*	**3.2 Adjusting toe-angle**

- ✓ **Competencies:**

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

- ✓ **Pedagogy/Learning experiences:**

- **Contact**:
  - ✓ Let learner read the INFORMATION SHEET 3.2
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 3.2
  - ✓ Use PPT, handouts, and poster.

- ✓ Provide a short video clip on adjusting toe-angle.

- **Non-contact:**
  - ✓ Let learner read the INFORMATION SHEET 3.2
  - ✓ Let them read on 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

✓ **Assessment:**

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.2
  - ✓ Let them read and perform OPERATION SHEET 3.2 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 3.2 and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.
  - ✓ Assess the learners' notes, assignments, etc. frequently.
  - ✓ Give questions or let them write short notes as homework after every session.
- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.2 through google classroom.
  - ✓ Let them read on OPERATION SHEET 3.2 and assess according to their understanding.
  - ✓ Let them solve and submit answers to SAMPLE SELF CHECK 3.2 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

✓ **Resources (online and offline):**

- ✓ Use 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concept(chapter/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: ✓ *Ensure vehicle is parked on level ground.* ✓ *Ensure proper handling of hand tools and equipment.*	**3.3 Adjusting camber**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 3.3
  - ✓ Let learner read and perform SKILL SHEET 3.3
  - ✓ Give demonstration on OPERATION SHEET 3.3
  - ✓ Give guided practice on OPERATION SHEET 3.3
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 3.3
  - ✓ Use PPT, handouts, and poster.
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 3.3
  - ✓ Let them read on OPERATION SHEET 3.3
  - ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
  - ✓ Provide link https://www.youtube.com/watch?v=XoNUnkqravI 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:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.3
  - ✓ Let them read and perform OPERATION SHEET 3.3 and assess according to checklist/ rubrics.

- ✓ Let the learners solve the SAMPLE SELF CHECK 3.3and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let the learners do the presentation and asses as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let them write short notes as homework after every session.

- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.3 through google classroom.
  - ✓ Let them read on OPERATION SHEET 3.3 and assess according to their understanding.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 3.3 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platforms.

E. Resources (online and offline):

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

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

Learning objectives	Core concept(chapter/topic)
3.3.1 Define caster. 3.3.2 State the purpose of the caster. 3.3.3 Explain the effects of caster failure. 3.3.4 Adjust caster angle Notes: ✓ *Ensure vehicle is parked on level ground.* ✓ *Ensure proper handling of hand tools and equipment.*	**3.4 Adjust caster angle**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 3.4
  - ✓ Give demonstration on OPERATION SHEET 3.4

- ✓ Give guided practice on OPERATION SHEET 3.4
- ✓ Let them read and Perform individual practices on OPERATION SHEET 3.4
- ✓ Use PPT, handouts, and poster.

- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 3.4
  - ✓ Let them read on 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:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.4
  - ✓ Let them read and perform OPERATION SHEET 3.4 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 3.4and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.
  - ✓ Assess the learners' notes, assignments, etc. frequently.
  - ✓ Give questions or let them write short notes as homework after every session.
- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.4 through google classroom.
  - ✓ Let them read on OPERATION SHEET 3.4 and assess according to their understanding.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 3.4 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ Use 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concept(chapter/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: ✓ *Ensure that the vehicle is supported with a safety stand in the correct position.*	**4.1 Performing inspection on tire wear**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 4.1
  - ✓ Let learner Read and Perform SKILL SHEET 4.1:
  - ✓ Give demonstration on OPERATION SHEET 4.1
  - ✓ Give guided practice on OPERATION SHEET 4.1
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 4.1
  - ✓ Use PPT, handouts, poster, and short video clips.
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 4.1
  - ✓ Let them read on 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:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.1
  - ✓ Let them read and perform OPERATION SHEET 4.1 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 4.1 and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.

- ✓ Let the learners do the presentation and asses as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let them write short notes as homework after every session.

- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.1 through google classroom.
  - ✓ Let them read on OPERATION SHEET 4.1 and assess according to their understanding.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 4.1 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ Use 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)

✓ **Learning objectives/ Broad theme / Strand/Chapter:**

Learning objectives	Core concept(chapter/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: ✓ *Ensure that the vehicle is jacked up at the correct position.*	**4.2 Performing static test drive**

✓ **Competencies:**

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

✓ **Pedagogy/Learning experiences:**

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 4.2
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 4.2

- ✓ Use PPT, handouts, and poster.
- ✓ Give a short video clip on the static test.

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

✓ **Assessment:**

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

✓ **Resources (online and offline):**

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

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

	Learning objectives	Core concept (chapter/topic)
4.3.1 4.3.2 4.3.3	State the importance of performing pre-driving checks. Explain the purpose of the dynamic test. Perform dynamic test drive	**4.3 Performing dynamic test drive**
Notes:	✓ *Ensure that all safety factors are followed while driving on the highway.*	

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 4.3
  - ✓ Let them 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.
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 4.3
  - ✓ Let them read on 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:

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

- ✓ Let them solve and submit answers of SAMPLE SELF CHECK 4.3 through google classroom or any other social media platforms.
- ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let the learner solve the question on the case study and submit the answer through social media platform.

E. Resources (online and offline):

- ✓ Use 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).

✓ **Learning objectives/ Broad theme / Strand/Chapter:**

Learning objectives	Core concept(chapter/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: ✓ *Ensure to check the machine before operation.*	***4.4*** **Performing wheel balancing**

✓ **Competencies:**

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

✓ **Pedagogy/Learning experiences:**

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 3.4
  - ✓ Let them read and perform SKILL SHEET 4.4
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 3.4
  - ✓ Let them read and perform JOB SHEET 4.4
  - ✓ Use PPT, handouts, and poster.
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 4.4
  - ✓ Let them read on 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
- ✓ **Assessment:**

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

  - ✓ **Resources (online and offline):**
  - ✓ Use 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: SERVICING ENGINE AUXILIARY

Chapter 1: Servicing Cooling System

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

Learning objectives	Core concepts (Chapters/Topics)
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 *Note:* ✓ *Ensure proper disposal of used coolant.*	**1.1 Changing Coolant**

B. Competencies:

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

C. Pedagogy/Learning Experiences

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

D. Assessment:

- **Contact:**
  - ✓ Make learners perform OPERATION SHEET 1.1 and assess as per the rubric/checklist.
  - ✓ Conduct class test, unit test, and viva after completing a topic.
  - ✓ Ask learners 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.
- **Non-contact:**
  - ✓ Make learners perform OPERATION SHEET 1.1 and send the short video as evidence through Google Classroom or any other social media platforms.
  - ✓ Ask learners to solve the SAMPLE SELF CHECK 1.1 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 (online and offline):

- ✓ 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	**Core concepts (Chapters/Topics)**
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 *Note:* ✓ *Ensure proper use of hand tools.*	**1.2 Changing thermostat valve**

B. Competencies:

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

C. Pedagogy/Learning Experience

- **Contact**:
  - ✓ Make the learners read INFORMATION SHEET 1.2
  - ✓ Make the learners perform OPERATION SHEET 1.2
  - ✓ Use handouts, PPT, and posters.
  - ✓ Provide a short video clip on the construction of the thermostat valve.
- **Non-contact:**
  - ✓ Let learners make notes after reading INFORMATION SHEET 1.2.
  - ✓ 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 learners explore through the given web link https://www.carengineered.com on the thermostat valve.

D. Assessment:

- **Contact:**
  - ✓ 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.
- **Non-contact:**
  - ✓ 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 (online and offline):

- ✓ 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
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:** ✓ *Ensure safe handling of pressure tester.* ✓ *Ensure that the vehicle is safely parked on level ground.*	**1.3 Checking leakages**

B. Competencies:

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

C. Pedagogy/Learning Experiences:

- **Contact**:
  - ✓ Let the student read INFORMATION SHEET 1.3
  - ✓ Provide PPT, handouts, and poster.
  - ✓ Make learners read and Perform SKILL SHEET 1.3
  - ✓ Let the student read and perform OPERATION SHEET 1.3
- **Non-contact:**
  - ✓ Let the student read INFORMATION SHEET 1.3
  - ✓ Let the learners follow the link and explore how to find coolant leak https://www.youtube.com/watch?v=XIn0RNzAsR8
  - ✓ Upload PPT, handouts, and poster.
  - ✓ 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 answers the questions on cooling system leakages uploaded in the Google Classroom and SAMPLE SELF CHECK3.1 from the textbook.

D. Assessment:

- **Contact:**
  - ✓ Assess the learners' ability to identify the different types of thermostat valve and their purposes.
  - ✓ Ask learners to perform OPERATION SHEET 1.3
  - ✓ Ask learners 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.

- **Non-contact:**

  - ✓ Ask learners to perform OPERATION SHEET 1.3 and send the short video as evidence through Google Classroom or any other social media platforms.
  - ✓ Ask learners to solve the SAMPLE SELF CHECK 1.3 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 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 (online and offline):

- ✓ CBLM and handouts.
- ✓ https://www.youtube.com/watch?v=h84uKzyxdNo (Diagnosing coolant leakage)
- ✓ https://www.youtube.com/watch?v=XIn0RNzAsR8 (How to find coolant leak)

A. Learning objectives/ Broad theme / Strand/Chapter

Learning objectives	Core concepts (Chapters/Topics)
1.2.1 State function of the radiator. 1.2.2 List types of radiators. 1.2.3 Illustrate construction of radiator. 1.2.4 State function of the radiator cap. 1.2.5 State function of the fan shroud. 1.2.6 Explain the purpose of bleeding air from the cooling system. 1.2.7 Change radiator assembly *Note:* ✓ *Ensure to remove the radiator when the engine is cool.* ✓ *Ensure proper handling of radiator fins.*	**1.4 Changing radiator assembly**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ let learners read the 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.

- **Non-contact:**
  - ✓ let learners read the INFORMATION SHEET 1.4
  - ✓ 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:

- **Contact:**
  - ✓ Let learners perform OPERATION SHEET 1.4 and assess according to rubric /checklist.
  - ✓ Ask learners 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 learners perform the task and rate them using rubrics, etc.
  - ✓ Provide necessary feedback and intervention based on the assessment of the model.
- **Non-contact:**
  - ✓ Ask learners 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 learners solve the SAMPLE SELF CHECK 1.4 from CBLM and send the answers through Google Classroom or any other social media platforms.
  - ✓ Give questions using different sources and let the learners submit answers through Google Classroom or any other social media platforms.
  - ✓ Give case study and submit answer through google classroom.

E. Resources (online and offline):

- ✓ 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
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. 1.5.7 Use belt tension gaug 1. 5.8 Change fan belt ***Note:*** ✓ *Ensure safe handling of belt tension gauge.*	**1.5 Changing fan belt**

B. Competencies:

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

C. Pedagogy/Learning Experiences

- **Contact**:
  - ✓ Let them read the INFORMATION SHEET 1.5
  - ✓ Let them 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.

- **Non-contact:**
  - ✓ Let them read the INFORMATION SHEET 1.5
  - ✓ Let them go through SKILL SHEET 1.5
  - ✓ Let them go through OPERATION SHEET 1.5
  - ✓ Share web link https://www.youtube.com/watch?v=VxZw5PxjPMk to learn how to change a fan belt.
  - ✓ Let learners go through uncovered topics in the textbook.
  - ✓ Let the learner explain how they extinguish the fire in their respective places.

D. Assessment:

- **Contact:**
  - ✓ Let learners perform OPERATION SHEET 1.5 and assess according to rubric /checklist.

- ✓ Ask learners 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 learners perform the task and rate them using rubrics, etc.
- ✓ Provide necessary feedback and intervention based on the assessment of the model.

- **Non-contact:**
  - ✓ Ask learners to perform OPERATION SHEET 1.5 and send the short video clip as evidence through Google Classroom or any other social media platforms.
  - ✓ Let learners 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 the learner solve the question on the case study and assess answers submitted through google classroom.

E. Resources (online and offline):

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

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

Learning objectives	Core concepts (Chapters/Topics)
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 *Note:* ✓ *Ensure proper disposal of used coolant and gasket.* ✓ *Ensure to wear hand gloves.*	**1.6 Changing water pump assembly**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let learners read the INFORMATION SHEET 1.6
  - ✓ Provide PPT, handouts, and poster
  - ✓ Let them read and perform OPERATION SHEET 1.6
  - ✓ Provide a short video clip on the working principle of the water pump.
- **Non-contact:**
  - ✓ Let learners read the INFORMATION SHEET 1.6
  - ✓ Let them read and perform OPERATION SHEET 1.6
  - ✓ 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:

- ✓ **Contact:**
  - ✓ As soon as the learners are aware of maintaining tools and equipment safety, ask them to perform OPERATION SHEET 1.6 and keep on practicing while performing any task.
  - ✓ Ask learners 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 learners perform the task and rate them using rubrics, etc.
  - ✓ Provide necessary feedback and intervention based on the assessment of the model.
- **Non-contact:**
  - ✓ Ask learners to perform OPERATION SHEET 1.6 and send the short video clip as evidence through Google Classroom or any other social media platforms.
  - ✓ Let learners 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 learners submit answers through Google Classroom or any other social media platforms.

E. Resources (online and offline):

- ✓ CBLM of classes IX-X
- ✓ 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
1.7.1 Explain the symptoms, causes, and remedies of cooling system failure. 1.7.2 Troubleshoot cooling system	**1.7 Troubleshooting cooling system**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let them read the INFORMATION SHEET 1.7
  - ✓ Use posters, pictures, and PPT.
  - ✓ Let them read and perform OPERATION SHEET 1.7
  - ✓ Let them read and perform JOB SHEET 1.7
- **Non-contact:**
  - ✓ Let them read the INFORMATION 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.
  - ✓ Let learners write notes from CBLM based upon their understanding.

D. Assessment:

- **Contact:**
  - ✓ Let learner read and perform OPERATION SHEET 1.7and assess according to rubric/checklist.
  - ✓ Ask learners to solve the SAMPLE SELF CHECK 1.7 given in the CBLM.
  - ✓ Conduct class tests by framing the questions from CBLM and other ICT resources.
  - ✓ Provide necessary feedback and intervention based on the assessment of the model.
- **Non-contact:**
  - ✓ Let the learners go through the links provided and assess the notes submitted through google classroom or any other social media platforms.
  - ✓ Upload questions through possible social media platforms from the provided videos, handouts, CBLM, and assess their answers.
  - ✓ Let the learners answer the SAMPLE SELF CHECK 1.7 and submit it through google classroom, etc.

E. Resources (online and offline):

- ✓ 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
2.1.1 Define lubrication system. 2.1.2 State types of the lubrication system. 2.1.3 Classify methods of the lubrication system. 2.1.4 Explain the construction of the lubrication system. 2.1.5 Explain the operation of the lubrication system. 2.1.6 Define viscosity. 2.1.7 State functions of engine oil. 2.1.8 List properties of engine oil. 2.1.9 Classify the specification of engine oil. 2.1.10 Explain the changing interval of engine oil. 2.1.11 State purpose of the dip stick. 2.1.12 Use oil filter wrench. 2.1.13 Change engine oil *Note:* ✓ *Ensure to dispose of the old engine oil and oil filter at the designated container.* ✓ *Ensure to wear hand gloves.*	**2.1 Changing engine oil**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let them read the INFORMATION SHEET 2.1
  - ✓ Let them read and perform OPERATION SHEET 2.1
  - ✓ Use posters, PPT and CBLM.
- **Non-contact:**
  - ✓ Let them read the INFORMATION SHEET 2.1
  - ✓ Let them read on OPERATION SHEET 2.1
  - ✓ 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=Nl0mFkpvAvM / https://www.youtube.com/watch?v=O1hF25Cowv8 to learn about how to change engine oil.

D. Assessment:

- **Contact:**
  - ✓ Let them 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 them solve SAMPLE SELF CHECK 2.1
  - ✓ Conduct class tests, unit tests, and viva.
  - ✓ Let learners do a presentation and assess according to criteria developed.

- **Non-contact:**
  - ✓ Assess their notes or the task assigned to them based on the links, videos, handouts, etc. Provided through possible social media platforms.
  - ✓ Let them 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 (online and offline):

- ✓ CBLM, PPT, handouts, and posters.
- ✓ https://www.youtube.com/watch?v=Nl0mFkpvAvM / 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
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	**2.2 Changing oil pressure switch**

B. 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.

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let them read the INFORMATION SHEET 2.2

- ✓ Provide flip chart notes.
- ✓ Let them read and perform OPERATION SHEET 2.2
- ✓ Use posters and PPT.

- **Non-contact:**
  - ✓ Let them read the INFORMATION SHEET 2.2
  - ✓ Let them read OPERATION SHEET 2.2
  - ✓ 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:

- **Contact:**
  - ✓ Let them perform OPERATION SHEET 2.2 and assess their ability based on rubric/checklist.
  - ✓ Let them solve SAMPLE SELF CHECK 2.2
  - ✓ Conduct the class test for theoretical as well as practical.
- **Non-contact:**
  - ✓ Assess the answers of SAMPLE SELF CHECK 2.2, notes, and the assignments such as short answer questions given to the learners through google classroom or any other social media platforms.
  - ✓ Let them solve the questions on the case study and assess the answers submitted through google classroom.

E. Resources (online and offline):

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

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

Learning objectives	Core concepts (Chapters/Topics)
2.3.1 Explain symptoms, causes, and remedies of lubrication system failure. 2.3.1 Troubleshoot lubrication system	**2.3 Troubleshooting lubrication System**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let them read the INFORMATION SHEET 2.3
  - ✓ Use PPT, handouts, posters, and short video clips.
  - ✓ Let them read JOB SHEET 2.3
  - ✓ Read and Perform OPERATION SHEET 2.3
- **Non-contact:**
  - ✓ Let them read the INFORMATION 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:

- **Contact:**
  - ✓ 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 them solve SAMPLE SELF CHECK 2.3
- **Non-contact:**
  - ✓ 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 (online and offline):

- ✓ 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=1wlZzTIP3g8 (Lubrication system troubleshooting)

Chapter 3: Service Petrol fuel system

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

Learning objectives	Core concepts (Chapters/Topics)
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**

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:* ✓ *Ensure to dispose old petrol fuel filter at the designated place.* ✓ *Ensure to wear hand gloves and goggles.*	

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let them read the INFORMATION SHEET 3.1
  - ✓ Let them read and perform OPERATION SHEET 3.1
  - ✓ Use PPT, handouts, posters, and short video clips
- **Non-contact:**
  - ✓ Let them 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=lHmRpX8aZ2A (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:

- **Contact:**
  - ✓ 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 them solve SAMPLE SELF CHECK 3.1
  - ✓ Give additional questions from other resources.
- **Non-contact:**
  - ✓ Assess the answers of SAMPLE SELF CHECK 3.1 through google classroom and any other possible social media platforms.
  - ✓ Let the learners write notes based on the learning resources provided to them 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 (online and offline):

- ✓ CBLM, handouts, short video clips, and DEMO++ performance guide.
- ✓ https://www.youtube.com/watch?v=lHmRpX8aZ2A (How to replace vehicle's fuel filter)
- ✓ https://www.youtube.com/watch?v=2YpRpCMPe6o (Explanation of fuel filter).

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

Learning objectives	Core concepts (Chapters/Topics)
3.2.1 State the function of the accelerator cable. 3.2.2 Explain the operating mechanism of the acceleration system. 3.2.2 Change accelerator cable *Note:* ✓ *Ensure proper handling of hand tools.*	**3.2 Changing accelerator cable**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let them read the INFORMATION SHEET 3.2
  - ✓ Demonstrate and let the learners perform OPERATION SHEET 3.2
  - ✓ Use PPT, posters, pictures, demonstration, and short video clips.
- **Non-contact:**
  - ✓ Let them read the INFORMATION SHEET 3.2
  - ✓ Let the learners go through OPERATION SHEET 3.2
  - ✓ 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:

- **Contact:**
  - ✓ Ask the learner to write notes based on their understanding from INFORMATION SHEET 3.2
  - ✓ Let the learners answer the SAMPLE SELF CHECK 3.2
  - ✓ Make the learner perform OPERATION SHEET 3.2 and assess according to checklist/ rubric.
- **Non-contact:**
  - ✓ Let them write and submit the notes based on the learning resources.
  - ✓ Assess the answers of SAMPLE SELF CHECK 3.2 and the questions are given to them through google classroom or any other social media platforms.

E. Resources (online and offline):

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

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

Learning objectives	Core concepts (Chapters/Topics)
3.3.1 Define the EFI system. 3.3.2 Differentiate carburetor and EFI system. 3.3.3 State advantages of EFI. 3.3.4 State the sub-system of the EFI system. 3.3.5 State function of engine sensors. 3.3.6 State function of the fuel injector. 3.3.7 List the types of the fuel injector. 3.3.8 Explain the construction of the fuel injector. 3.3.9 Explain the operation of the fuel injector. 3.3.10 Change fuel rail (fuel delivery pipe) and injector *Note:* ✓ *Ensure hand gloves and goggles.*	**3.3 Changing fuel rail (fuel delivery pipe) and injector**

B. 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.

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 3.3
  - ✓ Give demonstration on OPERATION SHEET 3.3
  - ✓ Give guided practice on OPERATION SHEET 3.3
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 3.3
  - ✓ Use PPT, handouts, and short video clips.
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 3.3
  - ✓ Let them read on OPERATION SHEET 3.3
  - ✓ 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:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.3

- ✓ Let them read and perform OPERATION SHEET 3.3 and assess according to checklist/ rubrics.
- ✓ Let the learners solve the SAMPLE SELF CHECK 3.3 and assess their understanding.
- ✓ Assess their understanding and ability to identify the components with functions.
- ✓ Let the learners do the presentation and asses as per the rubrics developed.
- ✓ Assess the learners' notes, assignments, etc. frequently.

- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.3 through google classroom.
  - ✓ Let them read on OPERATION SHEET 3.3 and assess according to their understanding.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 2.3 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
3.4.1 State function of PCV valve. 3.4.2 Illustrate the construction of the PCV valve. 3.4.3 Explain the operation of the PCV valve. 3.4.4 Change positive crankcase ventilation (PCV) valve	**3.4 Changing positive crankcase ventilation (PCV) valve**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 3.4

- ✓ Give demonstration on OPERATION SHEET 3.4
- ✓ Give guided practice on OPERATION SHEET 3.4
- ✓ Let them read and Perform individual practices on OPERATION SHEET 3.4
- ✓ Use PPT, handouts, and poster.
- ✓ Provide a short video on the operation of the PVC valve.

- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 3.3
  - ✓ Let them read on OPERATION SHEET 3.3
  - ✓ 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:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.4
  - ✓ Let them read and perform OPERATION SHEET 3.4 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 3.4and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.
  - ✓ Assess the learners' notes, assignments, etc. frequently.
  - ✓ Give questions or let them write short notes as homework after every session.
  - ✓ Check the learner note that has been jot down while teaching frequently.
- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.4 through google classroom.
  - ✓ Let them read on OPERATION SHEET 3.4 and assess according to their understanding.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 3.4 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
3.5.1 State function of the fuel tank. 3.5.2 Illustrate the construction of the fuel tank. 3.5.3 Service fuel tank *Note:* ✓ *Ensure proper storing of ignitable substances.* ✓ *Ensure to wear hand gloves and goggles.*	**3.5 Servicing fuel tank**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 3.5
  - ✓ Give demonstration on OPERATION SHEET 3.5
  - ✓ Give guided practice on OPERATION SHEET 3.5
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 3.5
  - ✓ Use PPT, handouts, and poster.
  - ✓ Provide a short video on servicing fuel tanks.
- **Non-contact:**
  - ✓ Let learner read the INFORMATION SHEET 3.5
  - ✓ Let them read on OPERATION SHEET 3.5
  - ✓ Provide short video clips, handouts, pictures, PPT, DEMO++ performance guide, and case study.
  - ✓ Provide link https://www.youtube.com/watch?v=Liiewkf1UIA 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:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.5
  - ✓ Let them read and perform OPERATION SHEET 3.5 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 3.5and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.

- ✓ Assess the learners' notes, assignments, etc. frequently.
- ✓ Give questions or let them write short notes as homework after every session.
- ✓ Check the learner note that has been jot down while teaching frequently.

- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.5 through google classroom.
  - ✓ Let them read on OPERATION SHEET 3.5 and assess according to their understanding.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 3.5 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ CBLM, PPT, handouts, and short video clips.
- ✓ https://www.youtube.com/watch?v=Liiewkf1UIA (How to clean the fuel tank)
- ✓ https://www.youtube.com/watch?v=369co9HM1SU (How to remove the fuel tank).

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

Learning objectives	Core concepts (Chapters/Topics)
3.6.1 Explain the symptoms, causes, and remedies for carburetor fuel system failure. 3.6.2 Troubleshooting petrol fuel system	**3.6 Troubleshooting petrol fuel system**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let learner read the INFORMATION SHEET 3.6
  - ✓ Give demonstration on OPERATION SHEET 3.6
  - ✓ Give guided practice on OPERATION SHEET 3.6
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 3.6
  - ✓ Let them read on JOB SHEET 3.6
  - ✓ Use PPT, handouts, and poster.
  - ✓ Provide short video bad fuel pump
- **Non-contact:**
  - ✓ Let learner read the INFORMATION SHEET 3.6
  - ✓ Let them read on OPERATION SHEET 3.6

- ✓ 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:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.5
  - ✓ Let them read and perform OPERATION SHEET 3.5 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 3.5and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.
  - ✓ Assess the learners' notes, assignments, etc. frequently.
  - ✓ Give questions or let them write a short note as homework after every session.
  - ✓ Check the learner note that has been jot down while teaching frequently.
- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 3.6 through google classroom.
  - ✓ Let them read on OPERATION SHEET 3.6 and assess according to their understanding.
  - ✓ Let them read JOB SHEET 3.6 and assess their understanding through question & answer session using zoom.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 3.6 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
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:* ✓ *Ensure to dispose of an old filter at the designated place.* ✓ *Ensure to wear hand gloves.*	**4.1 Changing the diesel fuel filter**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 4.1
  - ✓ Give demonstration on OPERATION SHEET 4.1
  - ✓ Let them 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.
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 4.1
  - ✓ Let them read on OPERATION SHEET 4.1
  - ✓ 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:

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

E. Resources (online and offline):

- ✓ Use 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
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 pu 4.2.4 Change feed pump	**4.2 Changing feed pump**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:

- ✓ Let the learner read the INFORMATION SHEET 4.2
- ✓ Give demonstration on OPERATION SHEET 4.2
- ✓ Give guided practice on OPERATION SHEET 4.2
- ✓ Let them 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.

- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 4.2
  - ✓ Let them read on OPERATION SHEET 4.2
  - ✓ 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=emBAbb9f3bc to learn about how inline injection pump works.

D. Assessment:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.2
  - ✓ Let them read and perform OPERATION SHEET 4.2 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 4.2and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.
  - ✓ Assess the learners' notes, assignments, etc. frequently.
  - ✓ Give questions or let them write a short note as homework after every session.

- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.2 through google classroom.
  - ✓ Let them read on OPERATION SHEET 4.2 and assess according to their understanding.
  - ✓ Let them solve and submit answers to SAMPLE SELF CHECK 4.2 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ Use 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=emBAbb9f3bc (How inline injection pump works).

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

Learning objectives	Core concepts (Chapters/Topics)
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 wear hand gloves and goggles.*	**4.3 Bleeding fuel system**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 4.3
  - ✓ Give demonstration on OPERATION SHEET 4.3
  - ✓ Give guided practice on OPERATION SHEET 4.3
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 4.3
  - ✓ Use PPT, handouts, and poster.
  - ✓ Provide a short video on the purpose of bleeding.
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 4.3
  - ✓ Let them read on OPERATION SHEET 4.3
  - ✓ 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=dflMxYDOPns 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.

✓ **Assessment:**

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.3

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

- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.3 through google classroom.
  - ✓ Let them read on OPERATION SHEET 4.3 and assess according to their understanding.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 3.5 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

✓ **Resources (online and offline):**

- ✓ Handouts, CBLM, pictures, PPT slides
- ✓ https://www.youtube.com/watch?v=dXX0dW6U5YY/ https://www.youtube.com/watch?v=dflMxYDOPns (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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
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)**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 4.4
  - ✓ Give demonstration on OPERATION SHEET 4.4
  - ✓ Give guided practice on OPERATION SHEET 4.4
  - ✓ Let them 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.
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 4.4
  - ✓ Let them read on OPERATION SHEET 4.4
  - ✓ 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:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.4
  - ✓ Let them read and perform OPERATION SHEET 4.4 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 4.4 and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.
  - ✓ Assess the learners' notes, assignments, etc. frequently.
  - ✓ Give questions or let them write short notes as homework after every session.
- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.4 through google classroom.
  - ✓ Let them read on OPERATION SHEET 4.4 and assess according to their understanding.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 4.4 through google classroom or any other social media platforms.

- ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
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:* ✓ *Use fuel injector pressure tester.* ✓ *Ensure safe handling of fuel injector pressure tester.* ✓ *Ensure to wear hand gloves and goggles.*	**4.5 Servicing fuel injector**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 4.5
  - ✓ Let learner red and perform JOB SHEET 4.5.
  - ✓ Give demonstration on OPERATION SHEET 4.5
  - ✓ Give guided practice on OPERATION SHEET 4.5
  - ✓ Let them read and Perform individual practices on OPERATION SHEET 4.5
  - ✓ Use PPT, handouts, and poster.
  - ✓ Provide a short video on servicing fuel tanks.
- **Non-contact:**

✓ Let the learner read the INFORMATION SHEET 4.5
✓ Let them read on OPERATION SHEET 4.5
✓ 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:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.5
  - ✓ Let them read and perform OPERATION SHEET 4.5 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 4.5and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.
  - ✓ Assess the learners' notes, assignments, etc. frequently.
  - ✓ Give questions or let them write short notes as homework after every session.
- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.5 through google classroom.
  - ✓ Let them read on OPERATION SHEET 4.5 and assess according to their understanding.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 4.5 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ 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. Learning objectives/ Broad theme / Strand/Chapter:

Learning objectives	Core concepts (Chapters/Topics)
4.6.1 Illustrate the construction of a distributor-type fuel pump. 4.6.2 Explain the operation of a distributer-type fuel pump. 4.6.3 Describe the components of the fuel injection pump.	**4.6 Setting fuel injection timing (Distributor type)**

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: ✓ *Ensure safe handling of the dial gauge.*	

B. 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.

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let the learner read the INFORMATION SHEET 4.6
  - ✓ Let learner read and perform SKILL SHEET 4.6
  - ✓ Give demonstration on OPERATION SHEET 4.6
  - ✓ Give guided practice on OPERATION SHEET 4.6
  - ✓ Let them 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.
- **Non-contact:**
  - ✓ Let the learner read the INFORMATION SHEET 4.6
  - ✓ Let them read on OPERATION SHEET 4.6
  - ✓ Provide short video clips, handouts, pictures, PPT, and case studies.
  - ✓ Provide link https://www.youtube.com/watch?v=nM3LRV20l6c to learn about setting fuel injection timing (Distributor type)

D. Assessment:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.6
  - ✓ Let them read and perform OPERATION SHEET 4.6 and assess according to checklist/ rubrics.
  - ✓ Let learners read and perform JOB SHEET 4.6 and assess according to the rubric.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 4.6 and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with their functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.
  - ✓ Let Asses the learners note, assignments, etc. frequently.
  - ✓ Give questions or let them write a short note as homework after every session.
- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.6 through google classroom.
  - ✓ Let them read on JOB SHEET 4.6 and assess according to their understanding

- ✓ Let them read on OPERATION SHEET 4.6 and assess according to their understanding.
- ✓ Let them solve and submit answers of SAMPLE SELF CHECK 4.6 through google classroom or any other social media platforms.
- ✓ Let the learners write and submit succinct notes through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
- ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ Handouts, short video clips, CBLM, DEMO++ performance guide, and CBLM.
- ✓ https://www.youtube.com/watch?v=nM3LRV20l6c (Setting fuel injection timing)

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

Learning objectives	Core concepts (Chapters/Topics)
4.5.1 Explain the symptoms, causes, and remedies for diesel fuel system failure. 4.5.2 Explain the symptoms, causes, and remedies for CRDI system failure. 4.5.3 Troubleshoot diesel fuel system	**4.7 Troubleshooting diesel fuel system**

B. Competencies:

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

C. Pedagogy/Learning experiences:

- **Contact**:
  - ✓ Let learner read the INFORMATION SHEET 4.7
  - ✓ Let learner read and perform JOB SHEET 4.7.
  - ✓ Give demonstration on OPERATION SHEET 4.7
  - ✓ Give guided practice on OPERATION SHEET 4.7
  - ✓ Let them 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.
- **Non-contact:**
  - ✓ Let learner read the INFORMATION SHEET 4.7
  - ✓ Let them read on OPERATION SHEET4.7
  - ✓ 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:

- **Contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.7
  - ✓ Let them read and perform OPERATION SHEET 4.7 and assess according to checklist/ rubrics.
  - ✓ Let the learners solve the SAMPLE SELF CHECK 4.7and assess their understanding.
  - ✓ Assess their understanding and ability to identify the components with functions.
  - ✓ Let the learners do the presentation and asses as per the rubrics developed.
  - ✓ Assess the learners' notes, assignments, etc. frequently.
  - ✓ Give questions or let them write short notes as homework after every session.
- **Non-contact:**
  - ✓ Let learner read and write notes after reading INFORMATION SHEET 4.7 through google classroom.
  - ✓ Let them read on OPERATION SHEET 4.7 and assess according to their understanding.
  - ✓ Let them solve and submit answers of SAMPLE SELF CHECK 4.7 through google classroom or any other social media platforms.
  - ✓ Let the learners write and submit a succinct note through google classroom or any other possible social media platforms, based on their understanding after watching the videos.
  - ✓ Let the learner solve the question on the case study and submit the answer through the social media platform.

E. Resources (online and offline):

- ✓ Use 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).

Chapter: 3 Interpreting Technical drawing

A. Learning Objectives/Broad theme/Strand/Chapter/Topics

Learning objectives	Core concept (Chapter/topics)
3.1.1 Describe sectional views. 3.1.2 Describe auxiliary views. 3.1.3 Draw isometric views for different joint Notes: *4 Ensure clean and neatness of drawing.* *5 Ensure Proper handling of drawing instruments.*	**3.1 Drawing isometric views for different joint**

B. Competencies:

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

C. Pedagogy/Learning experiences

- **Contact:**

✓ Let the learners 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 the learner performs OPERATION SHEET 3.1 individually.

✓ Let the learners solve SAMPLE SELF CHECK 3.1.

✓ Give additional problem-solving.

- **Non-contact:**

✓ Let the learners 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 the learner performs OPERATION SHEET 3.1 individually.

✓ Let the learners solve SAMPLE SELF CHECK 3.1.

✓ Give additional problem-solving.

D. Assessment

- **Contact**

✓ 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.

- **Non-contact**

✓ 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 (Online or offline)

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

Learning objectives	Core concepts(Chapters/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 Interprete simple mechanical drawing Notes: ✓ *Ensure clean and neatness of drawing.* ✓ *Ensure Proper handling of drawing instruments.*	**3.2 Interpreting simple mechanical drawing**

B. Competencies

i. Draw mechanical parts as per job requirements.

C. Pedagogy/Learning experience

- **Contact:**

✓ Let the learners read INFORMATION SHEET 3.2.
✓ Share the web link https://ocw.mit.edu/courses/mechanical-engineering/2-007-design-and-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 learners perform OPERATION SHEET 3.2.
✓ Let the learners' solve SAMPLE SELF CHECK 3.2.

- **Non-contact:**

✓ Let the learners read INFORMATION SHEET 3.2.
✓ Share the web link https://ocw.mit.edu/courses/mechanical-engineering/2-007-design-and-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 learners perform OPERATION SHEET 3.2.
✓ Let the learners' solve SAMPLE SELF CHECK 3.2.

D. Assessment

- **Contact:**

✓ 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.

- **Non-contact**

- ✓ 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(online and offline)

- ✓ Competency-Based Learning Materials for Classes IX and X, REC
- ✓ https://ocw.mit.edu/courses/mechanical-engineering/2-007-design-and-manufacturing-i-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. Learning objectives/Broad Theme/Strand/Chapter/Topics:

Learning Objectives	Core concept
3.3.1 Development of surfaces. 3.3.2 Drawing mechanical machine parts Notes: *4 Ensure clean and neatness of drawing* *5 Ensure Proper handling of drawing instruments*	**3.3 Drawing mechanical machine parts**

B. Competencies:

i. Develop surface of any mechanical machine parts.

C. Pedagogy/Learning Experiences

- **Contact:**

- ✓ Let the learners read INFORMATION SHEET 3.3.
- ✓ Let the learners explore information from the following web links:
  https://youtu.be/IwlrJOHgOB8
  https://youtu.be/IIj-f38rO5c
  https://youtu.be/zIblZ7dt3Dk
- ✓ Based on the information, the learner take notes and solve the questions given in the web link https://youtu.be/zIblZ7dt3Dk
- ✓ Let the learners perform OPERATION SHEET 3.3 individually.
- ✓ Let the learners solve SAMPLE SELF CHECK 3.3.

- **Non-contact:**

- ✓ Let the learners read INFORMATION SHEET 3.3.
- ✓ Let the learners explore information from the following web links:
  https://youtu.be/IwlrJOHgOB8
  https://youtu.be/IIj-f38rO5c
  https://youtu.be/zIblZ7dt3Dk

- ✓ Based on the information, the learner take notes and solve the questions given in the web link https://youtu.be/zIblZ7dt3Dk
- ✓ Let the learners perform OPERATION SHEET 3.3 individually.
- ✓ Let the learners solve SAMPLE SELF CHECK 3.3.

D. Assessment

- **Contact:**
- ✓ 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 CHECK3.3.
- ✓ Provide necessary intervention.
- **Non-contact:**
- ✓ 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 CHECK3.3 uploaded in Google Classroom.
- ✓ Provide necessary intervention.

E. Resources(online and offline)

Competency-Based Learning Materials for Class IX

- ✓ https://youtu.be/IwlrJOHgOB8 (Explanation on surface development)
- ✓ https://youtu.be/IIj-f38rO5c (Explanation on surface development)
- ✓ https://youtu.be/zIblZ7dt3Dk (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)