

**071505T4MTP**

**MECHANICAL PRODUCTION TECHNICIAN LEVEL 5**

**ENG/OS/ME/CR/02/5/A**

**PERFORM GRINDING OPERATIONS**

**July/August 2024**



**TVET CURRICULUM DEVELOPMENT, ASSESSMENT AND CERTIFICATION  
COUNCIL (TVET CDACC)**

**WRITTEN ASSESSMENT**

**TIME: 3 HOURS**

**INSTRUCTIONS TO CANDIDATE:**

1. This paper has **TWO** sections: **A** and **B**.
2. Answer **ALL** questions in section **A** and **THREE** questions from section **B**.
3. You are provided with a separate answer booklet.
4. Marks for each question are as indicated.
5. Do not write on the question paper.

**This paper consists of FIVE (5) printed pages with SIXTEEN (16) questions.  
Candidates should check the question paper to ascertain that all pages are printed as  
indicated and that no questions are missing.**

***Turn Over***

**SECTION A: 40 MARKS.**

*Answer ALL the questions in this section*

1. Personal protective Equipment (PPE) plays a crucial role in safeguarding a welder. Highlight FOUR reasons for wearing (PPE) while performing grinding. (4 Marks)
2. Grinding machines are made to perform different operations depending on the accuracy of machining that is required. Highlight TWO ways of classifying grinding machines in this context. (2 Marks)
3. In order to come up with different shapes of metallic components, material has to be removed from the metal surface. State the meaning of the following terms as used in machining.
  - a. Grinding;
  - b. Filing. (2 Marks)
4. All grinding machines use an abrasive wheel to remove material of the surface of the workpiece. State TWO characteristics of abrasive wheels used in grinding machines. (2 Marks)
5. Centerless grinding machine is very effective because it uses a continuous process of production of components. State TWO advantages and TWO disadvantages of centerless grinding machine. (4 Marks)
6. In a grinding process, it is advised to use coolant for various reasons. Highlight FOUR reasons for using cutting fluid when grinding. (4 Marks)
7. One of the major routine practice done in a mechanical engineering workshop is equipment maintenance. State FOUR importance of equipment maintenance. (4 Marks)
8. Grinding wheel manufacturer's take into account shapes of the workpiece and different grinding machine requirements when making grinding wheels. List FOUR types of grinding wheels used on grinding machines. (4 Marks)
9. A surface grinder has different parts which enables the operator to perform various tasks. The operator is required to understand the functions of each part in order to work effectively on the machine. List FOUR surface grinding accessories. (4 Marks)
10. During the development of an operation plan, it is important to identify the type of grinding wheel you are going to use during the process. Outline FOUR factors to consider when selecting a grinding wheel. (4 Marks)

11. A grinding machine operator is required to understand the use of all the parts of a grinding machine. Give ONE function of the following parts of a grinding machine;
  - a. Magnetic chuck;
  - b. Guard; (2 Marks)
12. Several students have come to your workshop for bench marking on how grinding operation is done. As a technician, highlight FOUR hazards associated with a grinding machine that you will communicate to them before demonstrating the process of grinding. (4 Marks)

**SECTION B: 60 MARKS**

*This section consists of **FOUR (4)** Questions. Answer any **THREE** questions.*

13.

- a. For quality surface finish to be achieved, several factor must be considered when performing grinding. Explain the meaning of the following terms as used in cylindrical grinding;
  - i. Feed;
  - ii. Grinding speed ;
  - iii. Depth of cut; (6 Marks)
- b. Grinding wheels wear over time. It is advisable to perform wheel dressing so as to maintain the cutting capabilities of the wheel. Describe the process of wheel dressing using a diamond dresser. (6 Marks)
- c. Grinding machines come in different sizes and shapes which are specific to their performance and production needs. Illustrate a pedestal grinding machine used in a mechanical workshop. (8 Marks)

14.

- a. A box of new grinding wheels has been brought to you. On the box, the initials; W-C-30-L-5-R, are indicated as the grinding wheel specification. Identify the meaning of each symbol on the initials. (6 Marks)
- b. Grinding process has critical stages where the operator must perform specific functions so that the production process becomes effective and efficient. Explain the meaning of the following terminologies as used in grinding;
  - i. Honing;
  - ii. Burnishing;
  - iii. Superfinishing; (6 Marks)
- c. A work piece is rotating at an axis of the cylindrical grinding machine with a grinding wheel of diameter 30 mm revolving at 100 rpm around the work piece. Calculate the cutting speed of the wheel. (4 Marks)
- d. As a technician, you are required to observe safety measures while using a grinding machine in order to keep yourself safe from any hazard associated with grinding.

State FOUR safety precautions you should observe to reduce risks of injuries

(4 Marks)

15.

a. Grinding wheels effectiveness is dependent on several factors. A worn out grinding wheel will not perform its functions as required. State the meaning of the following terms with regards to a grinding wheel;

i. Dressing;

ii. Truing;

(4 Marks)

b. Grinding machines are made to produce components of different shapes and sizes depending on the type of workpiece being ground. Explain how each of the following grinding operations are done:

i. Cylindrical grinding;

ii. Taper grinding;

iii. Gear grinding;

iv. Thread grinding.

(8 Marks)

c. Housekeeping is an essential practice for maintaining a conducive working environment in the workshop. Describe FOUR ways of performing house housekeeping. (8 Marks)

16.

a. A machinist chooses the right method of grinding based on the quality of the surface required. Explain the meaning of the following grinding methods:

i. Wet grinding;

ii. Dry grinding.

(4 Marks)

b. A surface grinding machine is essential to any finishing process in machining. Illustrate a surface grinding machine. (8 Marks)

c. Starting up a grinding machine should be done rightly to ascertain that each machine component is running rightly and to make sure that no injuries are encountered out of running a faulty machine. Describe EIGHT crucial steps that should be done when starting a grinding machine. (8 Marks)

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