THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

789 METAL WORKING AND MECHANICAL PRACTICE

(SUPPLEMENTARY)

Time: 3 Hours. **Year: 2000**

Instructions

1. This paper consists of **eight (8)** questions.
2. Answer any **five (5)** questions.
3. Each question carries **twenty (20)** marks.
4. Non-programmable calculators may be used.
5. Communication devices, programmable calculators and any unauthorized materials are **not** allowed in the examination room.
6. Write your **Examination Number** on every page of your answer booklet(s).

1. (a) Give the meaning of the term 'fitting' as used in mechanical workshop activities.

   (b) (i) Write four points to signify the proper use of a bench vice.

   (ii) State two precautions that should be observed to protect the vice from damage.

   (c) Describe the process of 'draw filing' and state its main purpose.

2. (a) (i) Define the term 'layout fluid' or 'marking medium'.

   (ii) Give three examples of materials commonly used as layout fluid in the workshop.

   (b) Describe the use of 'parallel blocks' in the setup of a workpiece on a machine table.

   (c) Explain the purpose of 'oil grooves' or 'oil ways' in plain bearings.

3. (a) Outline the steps required to properly read the measurement from a vernier caliper.

   (b) Explain the difference between accuracy and precision in metrology, giving a relevant example in machining.

   (c) Describe the proper method of cleaning and storing precision measuring instruments like a micrometer.

4. (a) Briefly explain three points to ensure the correct setting of the cutting edge of a hacksaw blade on the frame.

   (b) (i) Differentiate between the 'fixed jaw' and the 'sliding jaw' of a bench vice.

   (ii) State three reasons why a properly sharpened file must not be stored in a drawer with other tools.

   (c) What are the two main purposes of the tang on a hand file?

5. (a) Describe the following features in connection with files:

   (i) Size of the file

(ii) Cut of the teeth

(iii) Grade of cut of the file

(iv) Shape of the file

(b) Explain the term 'chipping' and how the process is carried out using a cold chisel.

(c) Describe the use of a surface plate in marking out and inspection.

6. (a) Explain the function of each of the following in marking out:

(i) The angle plate

(ii) Vee blocks

(iii) The surface gauge

(iv) The engineer's hammer

(b) Outline the general procedures of marking out a workpiece.

(c) Outline the requirements for laying out lines using a surface gauge or a vernier height gauge.

7. (a) Write four factors that should be considered when selecting a specific type of wrench for a task.

(b) Explain the importance of 'tinning' a soldering iron tip.

(c) Differentiate between 'punching' and 'piercing' in sheet metal work.

8. (a) Calculate the taper per foot (TPF) for a workpiece that has a large diameter of 50 mm, a small diameter of 40 mm, and a tapered length of 150 mm.

(b) If the total length of thread to be cut is 5 inches and the thread has 8 threads per inch (T.P.I.), calculate the total number of complete threads.

(c) Calculate the allowable working stress for a component if the Ultimate Tensile Strength (UTS) of the material is 700 MPa and a safety factor of 4 is to be used.