THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL OF TANZANIA

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

789 METAL WORKING AND MECHANICAL PRACTICE

Time: 3 Hour. **Monday, 14th May 2012 a.m.**

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) Define the term “reaming” as used in mechanical practice.

   (b) (i) Explain the difference between a reamer and a drill bit.

      (ii) State two types of reamers and their specific uses.

   (c) Describe the process of reaming a hole in a workshop setting.

   (d) State four precautions to be observed when using reamers.

2. (a) What is “heat treatment” and why is it applied to metals?

   (b) (i) List four types of heat treatment processes.

      (ii) Describe the main purpose of each type listed.

   (c) Explain the changes that occur in metal properties after heat treatment.

   (d) State four safety measures during heat treatment operations.

3. (a) Define the term “lathe tailstock” and state its function.

   (b) (i) List two operations that require the use of the tailstock.

      (ii) Explain how to adjust the tailstock for drilling operations.

   (c) Describe the process of taper turning using the tailstock offset method.

   (d) State four factors that may cause inaccuracy in taper turning.

4. (a) What is “squaring” in fitting and how is it performed?

   (b) (i) Identify three tools used in squaring metal workpieces.

      (ii) Explain how to check for squareness.

   (c) Describe two applications of squaring in mechanical workshop jobs.

   (d) List four common errors in squaring and how to avoid them.

5. (a) Define “thread pitch” and explain how it is measured.

   (b) (i) State the relationship between pitch and number of threads per inch.

      (ii) Describe how to use a pitch gauge.

   (c) Explain how improper thread pitch affects component fitting.

   (d) List four thread defects and their causes.

6. (a) What is meant by the term “coolant” in machining?

   (b) (i) Give three types of coolants used in metal cutting.

      (ii) State the purpose of each coolant type listed.

   (c) Describe how coolants improve machining performance.

   (d) State four hazards associated with improper use of coolants.

7. (a) Define “mechanical fastening” and give two examples.

   (b) (i) List three advantages of mechanical fasteners over welding.

      (ii) Explain two limitations of mechanical fastening.

   (c) Describe how to assemble a joint using nuts, bolts, and washers.

   (d) State four common causes of fastener failure in mechanical assemblies.

8. (a) What is a “bench vice” and how is it used in metalwork?

   (b) (i) Describe two types of jaws found on a bench vice.

      (ii) State two maintenance practices for bench vices.

   (c) Explain how improper use of a bench vice can damage workpieces.

   (d) List four safety rules when using a bench vice.