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 2007 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) What is meant by “marking out” in mechanical workshop practice?

   (b) (i) List three factors that affect the accuracy of marking out.

   (ii) Give three examples of marking out tools and their specific uses.

   (c) Explain four errors that may occur during marking out.

   (d) State four ways to improve accuracy in layout operations.

2. (a) Define the term “tool post” in a lathe machine.

   (b) (i) Describe two types of tool posts used on a centre lathe.

   (ii) Explain the importance of setting tool height correctly.

   (c) List three consequences of incorrect tool alignment during turning.

   (d) State four common turning operations carried out on a lathe.

3. (a) What is “tempering” and why is it carried out after hardening?

   (b) (i) List three effects of tempering on steel.

   (ii) State two tools that must be tempered before use.

   (c) Describe the procedure of tempering a cold chisel.

   (d) Give three effects of overheating during tempering.

4. (a) Define the term “coolant” in metal cutting operations.

   (b) (i) State three types of coolants and their application areas.

   (ii) Explain two reasons why coolants are essential during high-speed machining.

   (c) Describe three dangers of working without proper cooling.

   (d) List two safety precautions when handling cutting fluids.

5. (a) What is a “machine vice” and how is it used?

   (b) (i) Describe the difference between a machine vice and a bench vice.

   (ii) List three operations where a machine vice is used.

   (c) Give three precautions when clamping workpieces using a vice.

   (d) Explain the effect of improper clamping on machining accuracy.

6. (a) Define “shearing” and explain its importance in sheet metal work.

(b) (i) List three types of shearing tools used in the workshop.

(ii) Describe how a guillotine shear operates.

(c) State four safety precautions when using shearing equipment.

(d) List two disadvantages of shearing compared to sawing.

7. (a) What is a “slot drill” and how is it used in milling?

(b) (i) Differentiate between a slot drill and an end mill.

(ii) State two operations performed with a slot drill.

(c) Give three reasons for tool deflection during slot milling.

(d) List four methods to prevent tool deflection.

8. (a) Explain the term “surface finish” and its importance in mechanical fitting.

(b) (i) State three factors that influence surface finish during machining.

(ii) Describe two effects of poor surface finish on mechanical components.

(c) Explain the role of feed rate in determining surface finish.

(d) List three ways to improve surface finish when using a lathe machine.