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, 06th May 2006 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 “chipping” as applied in metal working.

   (b) State four uses of a cold chisel in mechanical workshop practice.

   (c) (i) Describe the procedure of chipping a flat surface using a flat chisel.

   (ii) State three precautions to observe when using a cold chisel.

   (d) Explain two advantages and two disadvantages of chipping compared to sawing.

2. (a) Describe the term “hand tap” as used in internal threading.

   (b) (i) Identify three types of taps used in a standard tap set and their functions.

   (ii) Explain two reasons why lubrication is important during tapping.

   (c) Describe the correct method of aligning a tap in a pre-drilled hole.

   (d) State three problems that may arise if the tap is misaligned during threading.

3. (a) Explain the term “cutting speed” in machining operations.

   (b) (i) A steel rod of 30 mm diameter is to be turned at 600 rpm. Calculate the cutting speed. Take $\pi = 3.142$.

   (ii) State two factors that affect the selection of cutting speed.

   (c) Describe the consequences of using a cutting speed that is too high.

   (d) Give three advantages of selecting correct cutting speed during machining.

4. (a) Define the term “arc blow” in electric arc welding.

   (b) (i) Explain three causes of arc blow during welding.

   (ii) Describe two methods used to reduce arc blow.

   (c) State three effects of arc blow on the welding process.

   (d) List four safety rules specific to electric arc welding.

5. (a) Define “machine tool” and give two examples used in a metal workshop.

   (b) (i) List three functions of a lathe machine.

   (ii) State two major differences between a shaper and a slotter machine.

   (c) Describe the working principle of a milling machine.

   (d) State four safety precautions when operating any machine tool.

6. (a) What is a “scraper” in metal fitting and what is its function?

(b) (i) Differentiate between flat scraper and triangular scraper.

(ii) State two uses of a half-round scraper.

(c) Describe the process of hand scraping a flat surface.

(d) List four characteristics of a properly scraped surface.

7. (a) Describe the function of a feeler gauge and give one use.

(b) (i) List three types of gauges used in fitting work.

(ii) Explain the use of a plug gauge.

(c) State three advantages of using gauges over measuring tools.

(d) Give two limitations of gauges in workshop applications.

8. (a) What is annealing and why is it done?

(b) (i) List three effects of annealing on a metal workpiece.

(ii) Explain two differences between full annealing and stress-relieving annealing.

(c) Describe how to perform an annealing operation on a medium carbon steel bar.

(d) State three dangers of improper heat application during annealing.