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, 09th May 2011 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 the term “standardization” in mechanical production?

   (b) (i) List three benefits of standardizing machine components.

   (ii) Explain two drawbacks of poor standardization in workshop tools.

   (c) Describe how standard threads promote interchangeability.

   (d) State four international standards used in mechanical engineering.

2. (a) Define “tapping drill size” and explain its significance.

   (b) (i) State the formula for calculating tapping drill size for metric threads.

   (ii) Calculate the tapping drill size for M12 × 1.75 thread.

   (c) Describe the consequences of using an incorrect tapping drill size.

   (d) List four precautions when performing tapping operations.

3. (a) What is “swarf” and where is it commonly produced in the workshop?

   (b) (i) Give three types of swarf based on shape or form.

   (ii) State two hazards associated with swarf.

   (c) Explain four methods of safe swarf disposal.

   (d) Describe two personal protective equipment (PPE) needed when handling swarf.

4. (a) Define the term “soldering flux” and state its function.

   (b) (i) List three types of flux used in metal joining.

   (ii) Explain two reasons for applying flux before soldering.

   (c) Describe the correct procedure for applying flux in a soldering process.

   (d) State four precautions when using flux during soldering.

5. (a) What is “tolerance grade” in mechanical design?

   (b) (i) List three common tolerance grades and their applications.

   (ii) Explain how tolerance grade affects manufacturing cost.

   (c) Describe the difference between unilateral and bilateral tolerance.

   (d) Give two examples of components that require tight tolerance.

6. (a) Define the term “die holder” and explain its use.

(b) (i) State three types of die holders.

(ii) Explain two factors to consider when selecting a die holder.

(c) Describe the correct method of cutting external threads using a die holder.

(d) List four causes of damage to dies during threading.

7. (a) What is a “drilling machine spindle”?

(b) (i) Explain three functions of a spindle in a drilling machine.

(ii) State two materials commonly used for making spindles.

(c) Describe how to check for spindle misalignment.

(d) State four effects of spindle misalignment in drilling operations.

8. (a) Define “thermal expansion” in metal properties.

(b) (i) Give three effects of thermal expansion in mechanical assemblies.

(ii) List two methods used to accommodate thermal expansion.

(c) Explain how poor control of thermal expansion leads to equipment failure.

(d) Give four examples of mechanical components that must account for thermal expansion in design.