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, 08th May 2017 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 “thread cutting”.

   (b) (i) State four types of thread cutting tools used in metal work.

   (ii) Describe how external threads are cut using a die.

   (c) Explain the importance of using cutting lubricant during thread cutting.

   (d) State four precautions observed when cutting threads manually.

2. (a) What is a “lathe machine”?

   (b) (i) Identify four main parts of a lathe and explain their functions.

   (ii) State two types of lathe operations.

   (c) Describe how facing operation is performed on a lathe.

   (d) State four safety rules when operating a lathe.

3. (a) Define the term “tempering” in heat treatment.

   (b) (i) Explain the purpose of tempering hardened steel.

   (ii) State the colour range used to control tempering temperature.

   (c) Describe the procedure of tempering a chisel.

   (d) State four results of overheating during tempering.

4. (a) What is “riveting” and where is it commonly used?

   (b) (i) State three types of rivet heads.

   (ii) Explain the difference between cold riveting and hot riveting.

   (c) Describe the procedure of forming a rivet joint.

   (d) State four defects that may occur in riveted joints.

5. (a) Define “die” as used in metal shaping.

   (b) (i) State two differences between blanking and punching dies.

   (ii) List three materials used to manufacture dies.

   (c) Explain the working principle of a compound die.

   (d) State four maintenance practices of die sets.

6. (a) What is “hand tapping”?

(b) (i) Mention the three taps used in internal threading.

(ii) Describe the tapping procedure for making an internal thread.

(c) Explain how to determine the correct tap drill size.

(d) State four common problems encountered during tapping and their solutions.

7. (a) Define the term “soldering”.

(b) (i) Differentiate between soft soldering and hard soldering.

(ii) State three tools used in soldering operations.

(c) Describe the steps involved in making a soldered joint.

(d) State four precautions to observe when soldering metal parts.

8. (a) What is “metal fatigue”?

(b) (i) Explain how cyclic loading contributes to fatigue failure.

(ii) Give two examples of parts affected by metal fatigue.

(c) Describe methods used to reduce fatigue failure in mechanical components.

(d) State four signs indicating that a metal part is experiencing fatigue.