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, 12th May 2014 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 “cutting speed” and state its significance in machining.

   (b) (i) Give the formula for calculating cutting speed.

      (ii) Calculate the cutting speed for a workpiece of 80 mm diameter rotating at 1000 rpm.

   (c) Explain how cutting speed affects tool life.

   (d) State four factors that determine cutting speed selection.

2. (a) What is meant by the term “filing” in metalwork?

   (b) (i) State three types of files and their uses.

      (ii) Describe the proper filing technique to achieve a flat surface.

   (c) Explain the importance of using a file card during filing.

   (d) List four safety precautions when using files.

3. (a) Define “chain drilling” and explain its purpose.

   (b) (i) Identify two tools used in chain drilling.

      (ii) State two advantages of chain drilling in workshop operations.

   (c) Describe the process of removing internal material using chain drilling.

   (d) State four common errors in chain drilling and how to avoid them.

4. (a) What is meant by “tool post” in a lathe machine?

   (b) (i) List three types of tool posts.

      (ii) Explain how each type supports the cutting tool.

   (c) Describe the procedure of setting a cutting tool to center height.

   (d) State four consequences of incorrect tool height setting.

5. (a) Define “countersinking” in drilling.

   (b) (i) State two differences between countersinking and counterboring.

      (ii) List three applications of countersinking in mechanical assemblies.

   (c) Describe how to perform countersinking on a drilled hole.

   (d) Give four precautions to observe during countersinking operations.

6. (a) What is meant by “tool wear”?

(b) (i) Identify four types of tool wear.

(ii) Explain how each affects machining performance.

(c) Describe three methods of reducing tool wear in metal cutting.

(d) State four indicators that a cutting tool needs replacement.

7. (a) Explain the term “go and no-go gauge”.

(b) (i) State two advantages of using go/no-go gauges in inspection.

(ii) List two examples of go and no-go gauges.

(c) Describe how to use a go and no-go plug gauge to check a hole.

(d) State four limitations of using go/no-go gauges.

8. (a) Define “bending allowance” in sheet metal work.

(b) (i) Give the formula for calculating total developed length.

(ii) A 2 mm thick sheet is to be bent 90° around a 10 mm radius. Calculate the bending allowance using $K = 0.33$.

(c) Explain the importance of bending allowance in fabrication.

(d) State four factors affecting bending allowance.