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 2008 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 “workpiece holding” in mechanical workshop.

   (b) (i) State three reasons for holding a workpiece firmly during machining.

   (ii) List three common work holding devices and their uses.

   (c) Explain four effects of poor workpiece clamping in machine operations.

   (d) Give two advantages and two disadvantages of magnetic chucks.

2. (a) What is a “thread pitch gauge” and how is it used?

   (b) (i) Describe two types of thread pitch gauges.

   (ii) State two limitations of using a thread pitch gauge.

   (c) Explain how to check the pitch of a bolt using a pitch gauge.

   (d) State four precautions to be followed when using pitch gauges.

3. (a) Define “orthographic projection” in mechanical drawing.

   (b) (i) State three views commonly used in orthographic drawings.

   (ii) Explain the use of hidden lines and centre lines in technical drawing.

   (c) Describe the difference between first angle and third angle projection.

   (d) List four importance of accurate orthographic drawings in workshop practice.

4. (a) What is a “drilling jig”?

   (b) (i) Give three advantages of using jigs in workshop drilling.

   (ii) State two disadvantages of jigs.

   (c) Explain how a drill jig ensures accuracy in repetitive production.

   (d) List four materials commonly used in making jigs.

5. (a) Define the term “heat conductivity” in relation to metals.

   (b) (i) List three good conductors of heat used in mechanical engineering.

   (ii) Describe two effects of poor heat conductivity during metal cutting.

   (c) Explain why copper is preferred in applications involving high thermal transfer.

   (d) State three engineering uses of materials with low heat conductivity.

6. (a) What is “bench drilling” and where is it commonly used?

   (b) (i) Describe the procedure for drilling a 10 mm hole in a mild steel bar.

      (ii) State two common problems encountered in bench drilling.

   (c) List four safety measures during bench drilling.

   (d) Explain the importance of selecting correct drill speed and feed rate.

7. (a) Define “centre lathe” and give two of its main applications.

   (b) (i) State three accessories used with the centre lathe.

      (ii) Explain the role of the tailstock.

   (c) Describe how taper turning is performed using the compound slide method.

   (d) State four safety precautions specific to lathe operations.

8. (a) What is “micrometre calibration” and why is it necessary?

   (b) (i) List three sources of error in micrometre readings.

      (ii) Describe how to check the accuracy of a micrometre.

   (c) State four good practices when using a micrometre.

   (d) Explain two consequences of using an uncalibrated micrometre in workshop fitting.