THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

789 METAL WORKING AND MECHANICAL PRACTICE

(SUPPLEMENTARY)

Time: 3 Hours. **Year: 2008**

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 shaping and its applications.

   (i) Describe four types of shaping operations with examples.

   (ii) Explain two safety precautions when using a shaping machine.

2. (a) Explain planing operations and their importance.

   (b) List four advantages of planing over shaping.

   (c) Describe three types of planers and their uses.

3. (a) (i) Define broaching and its applications.

   (ii) Explain four features of a broach tool.

   (b) List two advantages of broaching.

4. (a) Explain what soldering is and its applications.

   (b) Describe three advantages of soldering over welding.

   (c) Outline two factors affecting soldering quality.

5. (a) Describe the purpose of angle plates and V-blocks in marking out.

   (b) Explain the steps for marking out a cylindrical workpiece.

   (c) Discuss the use of a surface gauge in marking out.

6. (a) Explain power hacksaw operation.

   (b) List advantages of power hacksaws over hand hacksaws.

   (c) Identify two materials used for hacksaw blades and why they are preferred.

7. (a) A rectangular metal block of 100 mm × 50 mm × 25 mm is to be planed. Calculate:

   i) Material removal rate if depth of cut is 2 mm, feed is 0.3 mm/rev, and speed is 100 rev/min.

   ii) Power required if cutting force is 500 N.

(b) Determine the time required to remove 10 mm along the 100 mm length.

(c) Calculate cutting speed in m/min.

8. (a) A 20 mm thick steel plate is to be drilled and tapped with M12 × 1.75 thread. Calculate:

i) Drill diameter required for tapping.

ii) Time required if feed per revolution is 0.15 mm and depth of thread is 12 mm.

(b) Determine the torque required if the cutting force is 350 N at radius 6 mm.

(c) Calculate reaming allowance if the tapped hole is to final size 12 mm and drilled hole is 11.8 mm.