THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

789 METAL WORKING AND MECHANICAL PRACTICE

(SUPPLEMENTARY)

Time: 3 Hours. **Year: 2006**

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 drilling and its importance in workshop operations.

   (b) Explain four types of drill bits and their applications.

   (c) List two safety precautions when drilling metals.

2. (a) Explain hand filing in mechanical workshop practice.

   (b) Describe four points to ensure good results in filing.

   (c) Explain three methods of filing:

      i) Draw filing

      ii) Push filing

      iii) Curved filing

3. (a) Define sawing and its significance in metal cutting.

   (b) Differentiate between power hacksaw and hand hacksaw.

   (c) List two materials used for hacksaw blades and their advantages.

4. (a) Explain the purpose of lubrication in machining.

   (b) Describe four types of lubricants used in mechanical operations.

   (c) Discuss two methods of applying lubrication effectively.

5. (a) Define welding and its importance in workshop practice.

   (b) Explain two types of welding processes:

      i) Shielded metal arc welding

      ii) Gas welding

   (c) Outline three safety measures to prevent welding accidents.

6. (a) Describe the function of a surface grinder.

   (b) Explain four maintenance practices for grinding machines.

   (c) Draw a diagram of a grinding wheel and label four parts.

7. (a) A workpiece of diameter 40 mm is to be milled with a 10 mm depth of cut. Calculate:

      i) Material removal rate if feed is 0.15 mm/tooth and spindle speed is 1200 rev/min.

ii) Power required if cutting force is 600 N.

(b) Determine the time required to mill a length of 200 mm.

(c) Calculate the cutting speed of the workpiece. Use $\pi = 3.142$.

8. (a) A lathe operation is to produce a 30 mm diameter hole by drilling and boring. Calculate:

i) The spindle speed for a drill of 25 mm diameter at cutting speed of 25 m/min.

ii) Torque required if the cutting force is 400 N at a radius of 12.5 mm.

(b) Determine the feed per revolution if the hole is drilled in 20 seconds over a depth of 40 mm.

(c) Calculate the reaming allowance if the final hole is 30.2 mm and the drilled hole is 30 mm.