THE UNITED REPUBLIC OF TANZANIA

NATIONAL EXAMINATION COUNCIL

DIPLOMA IN TECHNICAL EDUCATION EXAMINATION

789 METAL WORKING AND MECHANICAL PRACTICE

(SUPPLEMENTARY)

Time: 3 Hours. **Year: 2010**

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) Explain the purpose of metal forming.
   (b) Describe three types of metal forming operations:
      i) Forging
      ii) Rolling
      iii) Extrusion
   (c) State two advantages of metal forming.

2. (a) Define drilling and countersinking.
   (b) Explain the procedure for drilling a pilot hole.
   (c) Describe two safety measures when drilling.

3. (a) Define filing and its purpose in mechanical work.
   (b) Describe three types of file cuts:
      i) Single cut
      ii) Double cut
      iii) Curved cut
   (c) List two ways to maintain a file.

4. (a) Explain the importance of lubrication in machining operations.
   (b) List four types of lubricants.
   (c) Explain two methods of applying lubrication effectively.

5. (a) Define welding and its importance.
   (b) Describe two types of electric arc welding:
      i) Shielded arc welding
      ii) Submerged arc welding
   (c) Outline three electrode selection criteria.

6. (a) Explain the use of a surface grinder in finishing operations.
   (b) Outline four maintenance procedures for grinders.
   (c) Draw and label a grinding wheel with four key parts.

7. (a) A cylindrical workpiece of diameter 60 mm is to be turned. Calculate:
      i) Material removal rate if depth of cut is 2 mm, feed is 0.25 mm/rev, and speed is 180 rev/min.
      ii) Power required for a cutting force of 800 N.

(b) Determine the time to reduce length of 100 mm by 5 mm diameter.

(c) Calculate cutting speed.

8. (a) A lathe is used to produce internal threads in a 40 mm bore. Calculate:

   i) Spindle speed if cutting speed is 30 m/min.

   ii) Leadscrew rotation per spindle turn to cut M16 × 2 thread.

   (b) Determine torque if cutting force is 450 N at radius 20 mm.

   (c) Calculate reaming allowance if drilled hole is 39.8 mm and final hole is 40 mm.